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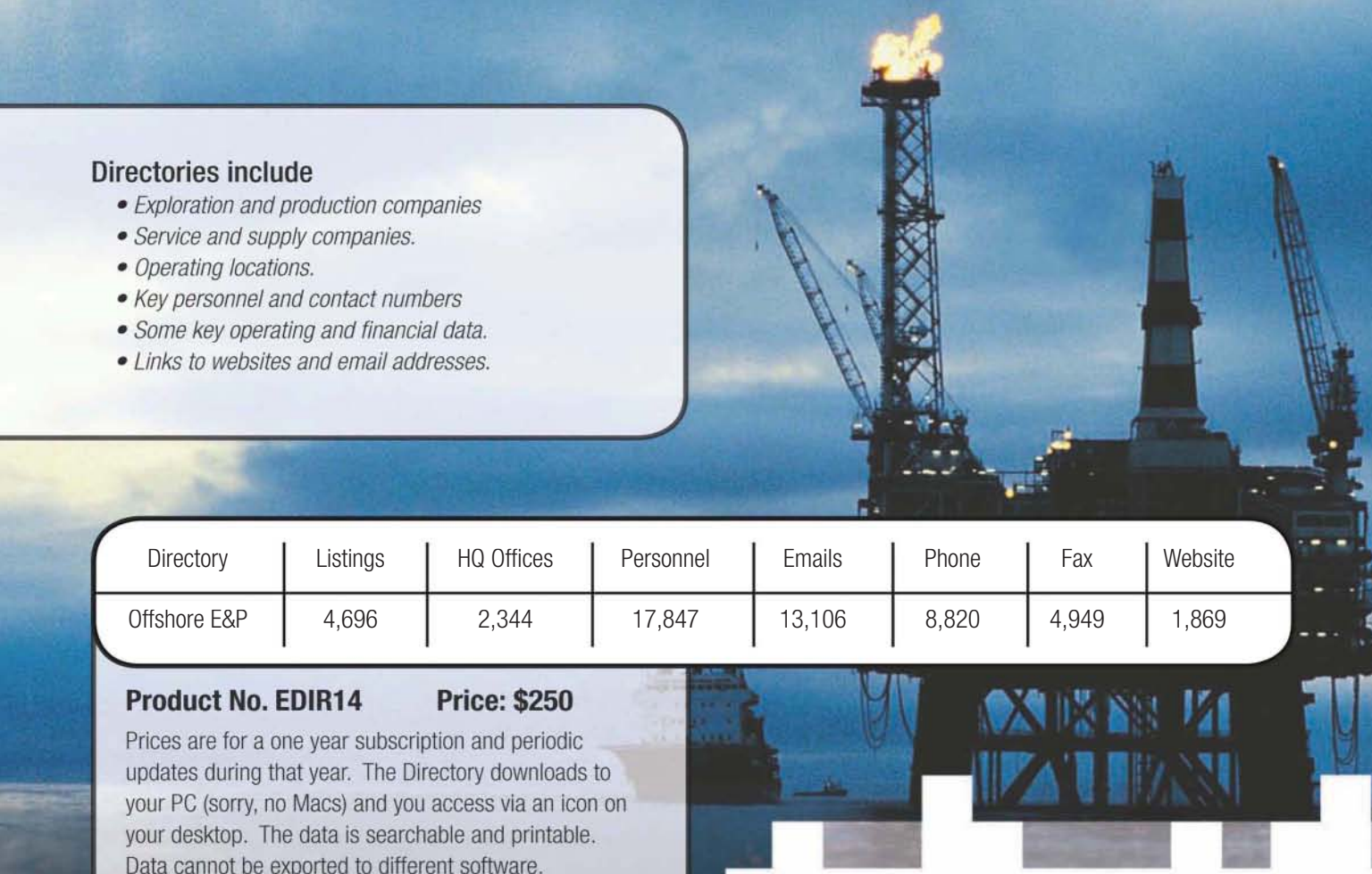

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- *Service and supply companies.*
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Oil And Gas In Africa

Verenex eyes commerciality in Libya's Ghadames basin
Operators, service providers grapple with well interventions
Regional factors define future polymer trading
PIPIP technology aids LNG transfer

OIL&GAS JOURNAL®

May 26, 2008
Volume 106.20

Oil and Gas in Africa

Regular Features

Cover

Tullow Oil PLC and its partners used the Belford Dolphin deepwater drillship to drill the Mahogany-1 well off Ghana and found oil last June within a Cretaceous sandstone reservoir. The well reached 13,780 ft TD on the deepwater West Cape Three Points Block. This first discovery on the Jubilee field was the beginning of Ghana's journey to becoming an oil producer by 2010 despite exploration since 1896. The special report, which starts on p. 20, looks at the challenges operators are facing in West Africa as competition for acreage intensifies, governments change policies, and project costs rise. Photo from Kosmos Energy.

General Interest

Exploration & Development

Drilling & Production

Processing

Transportation

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May 26, 2008

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General Interest — Quick Takes

Deutsche Bank slashes 2008 oil demand outlook

Major investment bank Deutsche Bank has reduced its global oil demand growth forecast for this year to 840,000 b/d from 1.16 million b/d. This is lower than the latest growth estimates by the International Energy Agency, the US Energy Information Administration, and the Organization of Petroleum Exporting Countries.

Even with the demand downgrade, Deutsche Bank's call for OPEC crude rises 200,000 b/d due to slipping forecasts for non-OPEC supply growth.

Oil is holding at over $125/bbl despite concerns of economic weakness and expectations of a strengthening US dollar.

"The forecasting tug-of-war continues between bearish analysts who believe that marginal costs near $75/bbl will dominate and those who see the need for demand destruction price levels near $150-200/bbl," said Deutsche Bank's Adam Sieminski. "We see increasing risk to the upside until demand shows more response to either price or income elasticities."

The bank's current forecast for average 2009 West Texas Intermediate and Brent crudes is $102.50/bbl, supported by a weak US dollar and funds-flow issues.

Goldman Sachs sharply raises oil price forecast

To balance worldwide economic growth with weak oil supply growth, oil prices will rise 14% in the second half of 2008, according to investment bank Goldman Sachs.

Goldman Sachs said the price surge is needed to balance global GDP growth of 3.8% against oil supply growth of just 1%. The bank's average second-half 2008 WTI price forecast is now $141/bbl, up from a previous estimate of $107/bbl. The average WTI price in the third quarter is forecast at $135.30/bbl, rising to $145.60/bbl in the fourth quarter.

Long-dated oil prices need to rise at a rate that will force demand growth in line with supply growth. And despite expected price increases, a contango market—in which prompt-month futures prices are higher than prices in later months—is likely to return, according to the report.

"Although we expect inventories to build in May, which will further pressure WTI term structure, ... we do not expect these softer fundamentals to translate into spot-price weakness given the strength in long-dated prices. We expect the bullish structural market to dominate the bearish cyclical weakness, dragging the market higher."

High prices are required to achieve a needed slowdown in demand growth, as opposed to thinking about it the other way around, i.e., that weakened demand growth creates lower prices, Goldman Sachs said. "We estimate that the rise in oil prices since 2002 has already destroyed 5 million b/d of demand relative to if oil (had) stayed at $20/bbl."

DOE suspends SPR oil purchases to year end

The US Department of Energy said May 16 that it will not sign contracts this year to continue filling the Strategic Petroleum Reserve from July through December.

The announcement came 2 days after the Senate passed the House's version of legislation suspending SPR purchases for the rest of the year unless crude oil prices fall below $75/bbl (OGJ Online, May 14, 2008). The measure passed both chambers by large enough margins to assure that a presidential veto could be overridden.

Up to 13 million bbl of crude won't be added to the SPR.

Willbros settles corrupt payment allegations

Willbros Group Inc. and its Willbros International Inc. subsidiary agreed to pay a $22 million criminal penalty for violating the Foreign Corrupt Practices Act, the US Department of Justice said on May 14.

DOJ had charged the oil and gas engineering and construction firm with bribing Nigerian and Ecuadorian officials to secure contracts in 2003-05.

Willbros Group also agreed to pay $10.3 million in disgorgement of all profits and prejudgment interest under a US Securities and Exchange Commission settlement. Four former employees also paid fines and settled SEC charges.

Willbros was charged with conspiring to bribe Nigerian and Ecuadorian officials, authorizing corrupt payments, falsifying books and records relating to corrupt payments, and implementing a tax fraud scheme. DOJ deferred prosecution of Willbros for 3 years, saying it would dismiss the criminal information then if Willbros abides by the agreement.

France prepares for gas trading exchange

Gaz de France, its transmission subsidiary GRTgaz, and Total SA's transmission operator Total Infrastructure Gaz France (TIGF) have given strong support to the Powernext project to set up a gas trading exchange in France to develop a competitive market.

GDF and GRTGaz have become shareholders of Powernext through a 6.6% and 5% stake respectively. Each will have a seat on the board of directors. TIGF "will implement the appropriate operating conditions to facilitate it."

The exchange, Powernext officials said, "will promote the emergence of an efficient liquid and transparent market as requested by France's Energy Regulatory Commission and the European Commission. There will be a matching of supply and demand in transparent and nondiscriminatory conditions and the setting up of a price reference for the French market."

Powernext Chief Executive Officer Jean-Francois Cornil-Lacoste said a preliminary market model will soon be provided to expert

WORLD CLASS OIL PLAY
CENTRAL UTAH OVERTHRUST BELT ACREAGE

Nearby 100 million bbl Wolverine discovery in a new oil province; twelve wells, producing about 5,000 BOPD.

OXY bought into the play and is partner with Wolverine.

Potential 2nd New Discovery

195,000+ acres: Fee, federal and state.

Some of the largest structures may each contain 100 million to half a billion barrels (BBOE) similar to Anschutz Ranch, East, and Whitney Canyon-Carter Creek fields in Wyoming.

Oil sourced from Mississippian Shales west of thrust area, similar to the Canadian Thrust Belt.

Many thrust sheets may be productive, similar to the Canadian Thrust Belt province.

Salt and mudstone, as much as 6,000 feet thick, are the seal for the Navajo Sandstone and Twin Creek Limestone.

Primary reservoir rock is the world class 1,200 foot thick Jurassic Navajo Sandstone, an aeolian deposit.

Secondary reservoir rock is 300 to 600 feet thick, fractured Jurassic Twin Creek Limestone.

Oil is 40 API gravity with 0.057% sulfur.

Paleozoic reservoir rocks are likely: 5,000 feet of Permian and Mississippian-Devonian carbonates (like the Canadian productive thrust salient).

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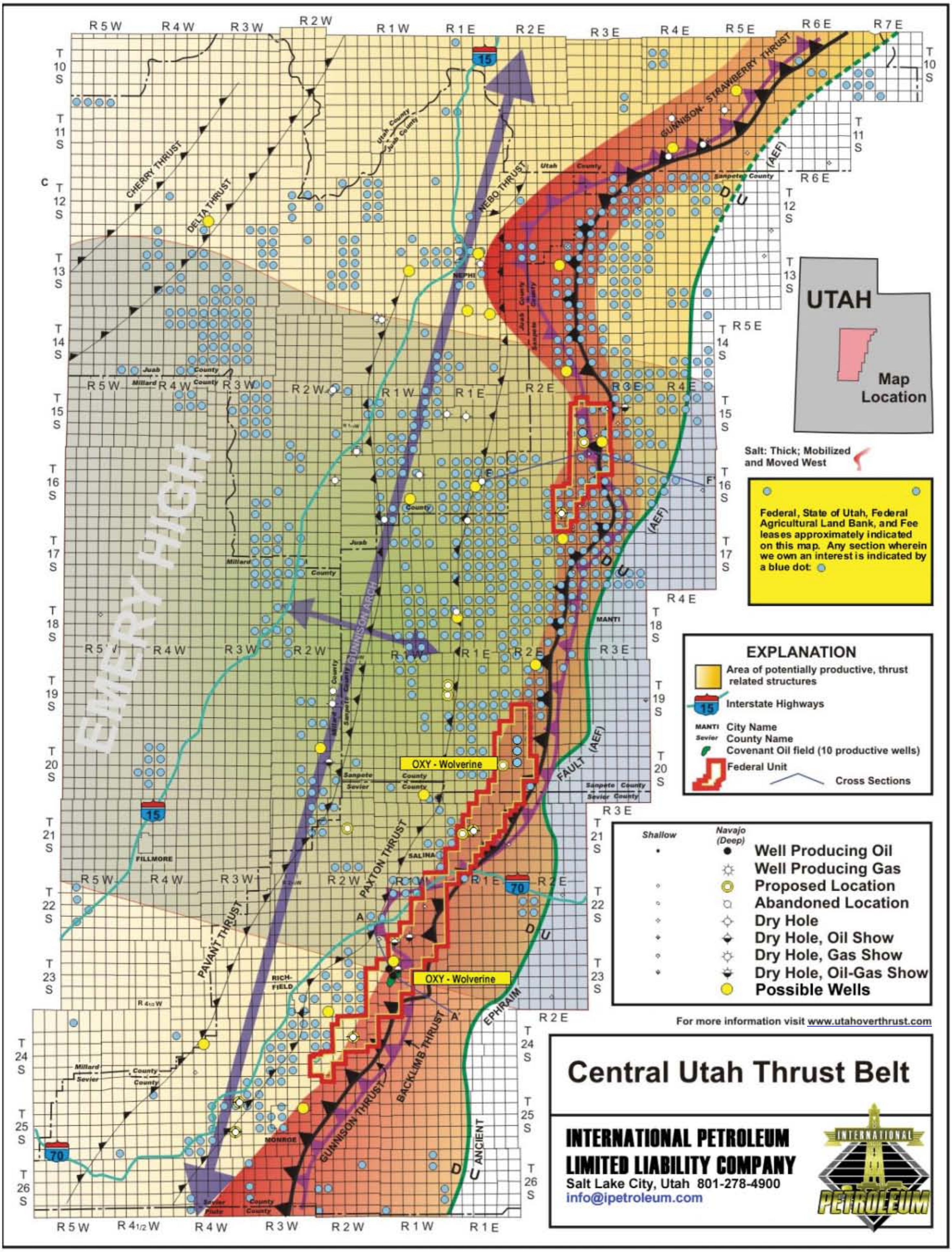
UTAH
Map Location
Salt: Thick; Mobilized and Moved West
Federal, State of Utah, Federal Agricultural Land Bank, and Fee leases approximately indicated on this map. Any section wherein we own an interest is indicated by a blue dot
EXPLANATION
Area of potentially productive, thrust related structures
Interstate Highways
City Name
County Name
Covenant Oil field (10 productive wells)
Federal Unit
Cross Sections
Shallow
Navajo (Deep)
Well Producing Oil
Well Producing Gas
Proposed Location
Abandoned Location
Dry Hole
Dry Hole, Oil Show
Dry Hole, Gas Show
Dry Hole, Oil-Gas Show
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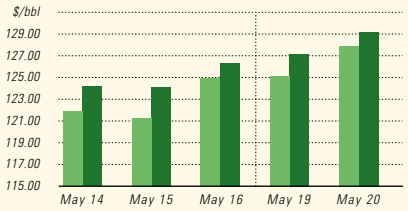
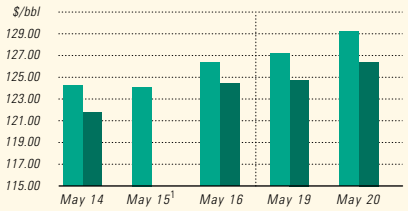
PAVANT THRUST
BACKLIMB THRUST
GUNNISON THRUST
FAULT (AEF)
EPHRAIM
ANCIENT
OXY - Wolverine
OXY - Wolverine
NEPHI
MANTI
SALINA
RICH-FIELD
FILLMORE
MONROE
15
70

Industry Scoreboard

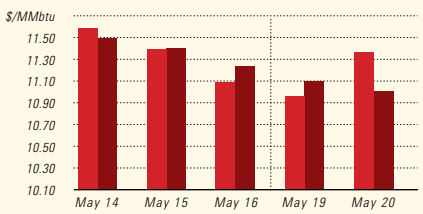
IPE BRENT / NYMEX LIGHT SWEET CRUDE



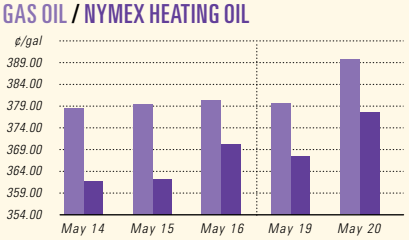
WTI CUSHING / BRENT SPOT



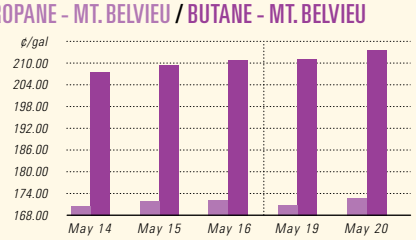
NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



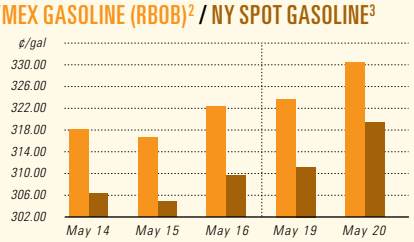
IPE GAS OIL / NYMEX HEATING OIL



PROPANE - MT. BELVIEU / BUTANE - MT. BELVIEU



NYMEX GASOLINE (RBOB)[2] / NY SPOT GASOLINE[3]



[1]Not available [2]Reformulated gasoline blendstock for oxygen blending.
[3]Non-oxygenated regular unleaded.

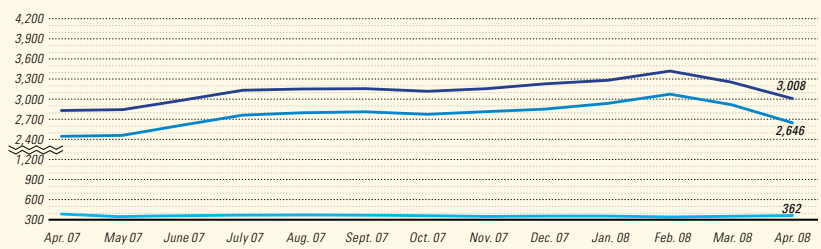
US INDUSTRY SCOREBOARD — 5/26

Latest week 5/9	4 wk. average	4 wk. avg. year ago[1]	Change, %	YTD average[1]	YTD avg. year ago[1]	Change, %
Demand, 1,000 b/d						
Motor gasoline	9,265	9,288	–0.2	9,045	9,101	–0.6
Distillate	4,202	4,169	0.8	4,224	4,329	–2.4
Jet fuel	1,554	1,541	–5.3	1,555	1,613	–3.6
Residual	778	727	7.0	665	788	–15.6
Other products	4,733	4,769	–0.8	4,883	4,872	0.2
TOTAL DEMAND	20,532	20,594	–0.3	20,228	20,717	–2.4
Supply, 1,000 b/d						
Crude production	5,107	5,224	–2.2	5,102	5,189	–1.7
NGL production[2]	2,473	2,415	2.4	2,323	2,335	–0.5
Crude imports	10,204	10,213	–0.1	9,788	9,979	–1.9
Product imports	3,563	3,760	–5.2	3,305	3,485	–5.2
Other supply[3]	1,333	804	65.8	1,320	990	33.3
TOTAL SUPPLY	22,680	22,416	1.2	21,838	21,978	–0.6
Refining, 1,000 b/d						
Crude runs to stills	14,662	14,982	–2.1	14,662	14,939	–1.9
Input to crude stills	14,850	15,466	–4.0	14,850	15,279	–2.8
% utilization	84.9	88.7	—	84.9	87.5	—

Latest week 5/9	Latest week	Previous week[1]	Change	Same week year ago[1]	Change	Change, %
Stocks, 1,000 bbl						
Crude oil	325,759	325,583	176	342,220	–16,461	–4.8
Motor gasoline	210,168	211,883	–1,715	195,235	14,933	7.6
Distillate	107,062	105,724	1,338	119,756	–12,694	–10.6
Jet fuel-kerosine	40,384	38,792	1,592	39,995	389	1.0
Residual	39,320	38,597	723	38,178	1,142	3.0
Stock cover (days)[4]			Change, %		Change, %	
Crude	22.0	22.3	–1.3	22.5	–2.2	
Motor gasoline	22.7	22.9	–0.9	21.0	8.1	
Distillate	25.5	25.2	1.2	28.6	–10.8	
Propane	32.7	30.0	9.0	31.8	2.8	
Futures prices[5] **5/16**			**Change**		**Change**	**%**
Light sweet crude, $/bbl	124.93	123.00	1.93	62.00	62.93	101.5
Natural gas, $/MMbtu	11.36	11.29	0.07	7.75	3.61	46.6

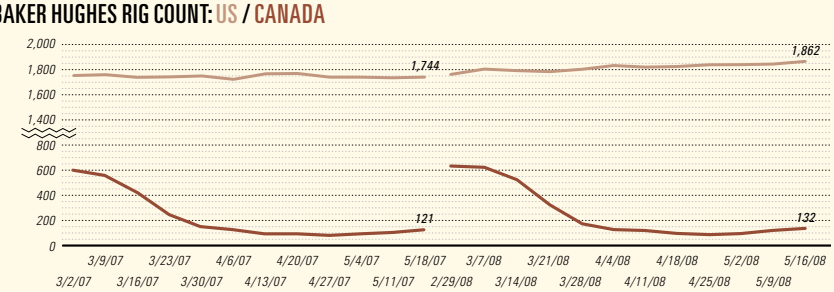
[1]Based on revised figures. [2]Includes adjustments for fuel ethanol and motor gasoline blending components. [3]Includes other hydrocarbons and alcohol, refinery processing gain, and unaccounted for crude oil. [4]Stocks divided by average daily product supplied for the prior 4 weeks. [5]Weekly average of daily closing futures prices.
Sources: Energy Information Administration, Wall Street Journal

BAKER HUGHES INTERNATIONAL RIG COUNT: TOTAL WORLD / TOTAL ONSHORE / TOTAL OFFSHORE



Note: Monthly average count

BAKER HUGHES RIG COUNT: US / CANADA



Note: End of week average count

market players, who will finalize specifications of the products and services offered.

A spot market is expected to be launched by yearend on all of France's balancing zones (which will be reduced to three on Jan. 1, 2009) and a futures market with physical delivery in the North zone. ✦

Exploration & Development — *Quick Takes*

BG Norge finds oil, gas in Norwegian North Sea

BG Norge AS has found oil and gas with exploration well 15/12-19 on Production License 292 (PL 292) in the Norwegian North Sea. The well, combined with the nearby 6/3-1 discovery, could hold as much as 3-5 million cu m of oil equivalent.

The well, south of Varg field, tested 750 cu m/day from Jurassic and Triassic reservoirs, the Norwegian Petroleum Directorate said. BG gathered data from the well and is carrying out field development studies.

The Maersk Guardian jack up rig drilled the well in 86 m of water to 3,169 m TVD subsea. The well will be plugged and abandoned.

BG has 60% interest in the license, and its partner Lundin 40%.

Trinidad and Tobago offers five blocks for bid

Trinidad and Tobago said bids will be welcomed in the third quarter for five new exploration blocks in its 2008 bid round. They include:

- Block 4(b) in 400-800 m of water off Trinidad and Tobago's east coast. It lies just east of BG Group's prolific Dolphin field, which holds more than 5 tcf of gas.
- Block 5(d), also off the east coast, is north of the Manikin gas discovery in 450-800 m of water.
- NCMA (3), (4), and (5)—all off the northern coast—are believed to be gas-prone. They lie in more-shallow water (100-550 m).

The minister said he is hopeful bids will be awarded by January 2009.

He also said three 2006 ultradeep water bid parcels will be rebid in 2009.

EBRD loan, stake advance Siberian development

Irkutsk Oil, under concession rights granted by Russia, is developing oil fields in Siberia that could facilitate the extension of Russia's planned East Siberia Pacific Ocean oil pipeline from Skovorodino, near Russia's border with China, to the Sea of Japan.

A joint venture set up by Irkutsk Oil and government-affiliated Japan Oil, Gas, & Metals National Corp., is scheduled to start test-drilling for oil in the region as early as this winter.

Irkutsk Oil will invest more than $500 million on operations over the next 7 years. The European Bank for Reconstruction and Development will provide partial financing and will acquire an 8% stake in the project.

Taitai discovery extends Uganda prospectivity

The Taitai-1 oil discovery at Taitai in the Butiaba area of Uganda's Block 2 cut 5 m of net gas pay and at least 8 m of net oil pay, said Tullow Oil PLC. A thick section of oil-stained basement was also encountered and provides upside potential at this location and elsewhere in the basin, the company said (see map, OGJ, Feb. 11, 2008, p. 36). The well was drilled to a TD of 1,006 m and was successfully logged. Downhole pressure testing and sampling confirmed the presence of movable 30° gravity oil and a potential oil column as thick as 80 m in sands above the basement play.

"The uppermost oil sand exhibited high permeability; however pressure sampling of underlying oil sands was inconclusive....[So] the well is being sidetracked and the oil-bearing zones cored to collect further reservoir and fluid information," said Tullow.

Taitai-1 well is the first of a nine-well exploration campaign in the Butiaba area.

Deeper gas proved in Norwegian Sea's Alve field

Exploration extension drilling in Alve field in the Norwegian Sea confirmed natural gas and condensate in a reservoir deeper in mid-Jurassic sandstone than was previously known. Operator StatoilHydro said a thin oil zone also was proved below the gas.

Well 6507/3-5S was drilled to 3,834 m subsea in 368 m of water. Based on a preliminary estimate, the discovery includes 3-5 billion cu m of gas, StatoilHydro said.

The well will be temporarily plugged.

Alve field was proved in 1990 in Production License 159B (Jan. 19, 2007, Newsletter). ✦

Drilling & Production — *Quick Takes*

CERA: upstream costs up 6% over 6 months

Constructing upstream oil and gas facilities has increased by 6% over the past 6 months and have doubled since 2005, according to the most recent IHS Inc.-Cambridge Energy Research Associates (CERA) Upstream Capital Costs Index (UCCI).

The UCCI is a proprietary measure of project cost inflation similar in concept to the Consumer Price Index. It provides a benchmark for comparing costs around the world and draws upon proprietary IHS and CERA databases and analytical tools.

Areas with a high level of projects under way in the Middle East, West Africa, South America, and Australia have seen higher than average cost increases, compared with areas of moderate escalation in North America and Europe.

"Rising costs have become one of the 'new fundamentals' driving the price of oil," said Daniel Yergin, chairman of CERA.

Increased demand for raw materials and transportation is driving costs, which are contributing to delays and postponements of many projects, said Pritesh Patel, director for the Capital Costs Analysis Forum for Upstream, a CERA Industry Forum. "Exchange rate fluctuations and the weakening US dollar also contribute." Because the dollar is the reporting currency of choice, this weakness has a dramatic effect on final construction costs for projects in regions

such as Europe and West Africa, Patel said.

The biggest leap on CERA's UCCI was for deepwater subsea equipment, particularly umbilicals and control systems. These costs have jumped by 12% over the past 6 months due to manufacturing constraints and higher costs for materials and labor.

The costs of vessels used to install platforms, lay pipe, and support offshore development also are on the rise after briefly leveling off in 2007. Their rates have increased 2% in the past 6 months.

Gazprom winter gas production beats previous year's

OAO Gazprom increased natural gas production in the first 4 months of 2008. Despite a relatively mild 2007-08 winter between January and April, Gazprom produced 199.4 billion cu m (bcm) of gas (about 7 tcf), 4.2 bcm more than for the same period in 2007.

Current forecasts call for Gazprom's production to hit about 570 bcm for 2010, growing to 610-615 bcm/year by 2015 and 650-670 bcm/year by 2020. By that time, new fields will account for nearly a half of all gas produced.

Gazprom spokesman Sergei Kupriyanov said growth of the company's gas reserves has considerably surpassed its production for the third year running. "According to preliminary estimates, in 2007 our success in exploration led to an increase in discovered reserves" to 585 [bcm], while production was 548.5 [bcm].

In 2006, he said, exploration increased reserves by 590.9 bcm, while production totaled 556 bcm. In 2005, the figures were 583.4 bcm and 555 bcm, respectively.

Gazprom's strategy is that by 2010, three new gas production centers will be operating: the Arctic shelf, Yamal Peninsula, and East Siberia-Far East, which are "expected to develop into major production hubs over time," it said.

In the near future, Shtokman and Bovanenkovo, two fields in the Arctic shelf and Yamal, will be put into operation.

Parker plans two newbuild arctic land rigs

A BP PLC subsidiary signed a letter of intent with a Parker Drilling Co. subsidiary for a drilling contract in Alaska requiring two newbuild land rigs.

A 5-year drilling contract, with a 5-year option, is expected to be executed by May 30, Parker said. Operations are anticipated to commence during the second half of 2010.

The arctic-class land rigs will feature safety-engineered equipment to reduce vibration, noise, and personnel hazards; technology to decrease well times and increase the number of wells drilled each year; onboard command center centralizing decision-making processes; and fully enclosed rig modules for operation in arctic conditions down to –50° F.

Oilexco lets UK North Sea subsea work to Technip

Oilexco North Sea Ltd. has signed an agreement with Technip SA for engineering, project management, and construction services for subsea developments at Shelley oil field and other fields in the UK North Sea.

Using the Ocean Guardian, Oilexco drilled 22 well bores in Shelley field to define the limits of the oil accumulation.

The company expects the contracted Sevan Voyageur FPSO to begin production in the fourth quarter.

Technip will provide diving support, trenching support, and umbilical installation vessels, inspection, repair, and maintenance. It will execute the engineering, installation, and commissioning of pipelines, a control umbilical and jumpers, flexible risers, a subsea manifold, and attendant flowlines.

Norway cuts 2008 oil production forecast

Norway has revised its oil production forecast for 2008 to 2.4 million b/d—down from the previous projection of 2.5 million b/d—in its revised budget for this year. The estimate includes natural gas liquids and condensate.

The Norwegian energy ministry said it expected oil production to continue falling because of maturing Norwegian continental shelf fields.

However, gas production will increase, with gas sales at 100 billion cu m in 2008, estimated to be 10% higher than in 2007. In 2009 gas sales are expected to increase to about 110 billion cu m.

Operators have planned 125 billion kroner investment in 2008, including exploration, which also is 10% higher than 2007.

The country has produced about a third of the expected recoverable petroleum resources, with more oil coming on stream than gas. The ministry said about half of the total expected oil resources have been produced.

The government expects to receive 356 billion kroner net cash flow from the petroleum industry in 2008 because of high oil prices. ✦

Processing — *Quick Takes*

Navajo refinery FCC unit down for repair

The Navajo Refinery in Artesia, NM, is operating at reduced rates because the FCC unit has been shut down for repairs. Owner Holly Corp. said crude charge of the 85,000-b/d refinery has been cut by 55,000 b/d while repairs are under way.

An instrument control malfunction required shutdown of the FCC unit May 7. Catalyst circulation problems during restart forced another shutdown May 16. Holly says repairs to take several days.

The unit has reported capacity of 18,500 b/cd (OGJ, Dec. 24, 2007, p. 50).

Holly expects average output for all of May to be down by 13,000-18,000 b/d of gasoline and 3,000-5,000 b/d of diesel.

CNPC takes stake in Nippon Oil Takaishi refinery

Nippon Oil Corp. and China National Petroleum Corp. have agreed to jointly manage the existing 115,000-b/d Takaishi refinery in Osaka province and to export its products to China and other regional markets. Nippon will have a 51% stake in the venture and CNPC the remaining interest.

The Takaishi facility, the sixth-largest among Nippon Oil's seven

domestic refineries, has seen its capacity utilization fall sharply due to slumping demand in Japan for such refined products as gasoline, gas oil, and fuel oil.

Demand for these products has been surging in China, however, on the back of strong economic growth. Refineries there are having difficulty meeting the demand.

Tesoro R&M agrees to civil penalty for air violations

Tesoro Refining & Marketing Co., San Antonio, has agreed to pay a $1.5 million civil penalty to settle air-quality violations at its 166,000-b/d Golden Eagle refinery at Martinez, Calif. The refinery is the company's largest facility and the second-largest refinery in Northern California.

San Francisco's Bay Area Air Quality Management District (AQMD) said the settlement covers violations that occurred over 3 years, including "failure to inspect tanks and equipment, air pollution releases that resulted from equipment malfunctions, and administrative and reporting violations."

Tesoro will undertake capital improvement projects and equipment upgrades. It will replace several outdated systems with equipment incorporating the best available pollution control technology. AQMD also said Tesoro also agreed to retrofit heavy-duty diesel vehicles in and around the refinery with particulate traps to reduce particulate pollution. ✦

Transportation — *Quick Takes*

Another Northeast offshore LNG terminal proposed

Excalibur Energy (USA) Inc., a 50-50 joint venture of Canadian Superior Energy Inc. and Global LNG Inc., New York, reported plans to build a 2.4-bcfd LNG terminal off New Jersey and subsea pipelines to shore.

The proposed $550 million Liberty natural gas transmission line will consist of a "fully submerged, offshore gas importation turret anchored to the seafloor" in 100 ft of water 15 miles off New Jersey; 50 miles of 36-in. OD subsea pipeline; a directionally drilled underground shoreline approach near South Amboy, NJ; and 11 miles of 36-in. onshore pipeline to interconnections in Linden, NJ.

Gas transmission capacity in the Linden area totals more than 4 bcfd. Excalibur will submit US permit applications early next year and targets late 2011 for start up.

Excalibur said the project is not associated with Houston-based Excelerate Energy, which has pioneered offshore LNG terminals off Texas and the UK and operates several regasification carriers.

Excalibur, while declining to identify the specific offloading system planned, said the regas vessels will "temporarily connect to permanently anchored turrets." Roger Whelan, Excalibur's president and CEO, told OGJ the company has narrowed its choices of technology and expects to announce that within the next 3 weeks.

No LNG supply contracts have been signed, but Whelan said Atlantic Basin suppliers, especially Trinidad and Tobago's Atlantic LNG Train X, currently under design, are logical sources.

He said the US Energy Information Administration has projected that the US Northeast's growing population will "need an additional 30% more energy in the coming decades relative to the current demand, with energy shortfalls beginning as soon as 2012."

The project has been developed over the last 2 years, he said, and "included an independent survey of 1,000 New York and New Jersey residents and discussions with several key stakeholders in the area.

Northeast Gateway LNG port starts operation

Houston-based Excelerate Energy LLC's Northeast Gateway (NEG) Deepwater LNG Port in Massachusetts Bay, 18 miles east of Boston, has begun commercial operations. The company's Excellence regasification vessel off-loaded its natural gas cargo into the HubLine pipeline system, operated by Spectra Energy, Houston.

With the inaugural delivery, Excellence will offload 1 bcf of gas to test all of the port and pipeline systems. The system will be able to handle peak deliveries of 800 MMcfd of gas through two turret buoys and under normal operations will deliver about 500 MMcfd (OGJ Online, May 19, 2008).

Italy streamlines permitting for LNG, regas plants

Last October, Italy's Council of Ministers approved plans to simplify and accelerate the permitting process for new LNG terminals to ease planning restrictions, which had prevented several LNG terminal developers from securing final planning approvals for their facilities.

The new plans no longer require operators to consult the public works council Consiglio superiore dei lavori pubblici. Instead, Italy's Environment Ministry will conduct and complete an environmental impact assessment for final authorization by the Ministry of Economic Development, the Ministry of Environment, and the Ministry of Infrastructure.

ERG SPA Chief Executive Officer Alessandro Garrone said the 8 billion cu m/year regasification terminal his firm plans to build with Royal Dutch Shell PLC at Priolo, Sicily, has received environmental clearance after a 3-year wait.

In February, Italy's Il Sole 24 Ore said the project had already cost 15 million euros.

Construction can now begin in 2010, and the facility will be operational in 2013. The plant's capacity can later be expanded to 12 billion cu m/year.

Earlier this month, Italy's environment ministry also approved plans by Compagnie Industriali Riunite SPA's energy unit Sorgenia SPA and northwest utility Iride SPA for construction of an LNG terminal at Gioia Tauro in Calabria (OGJ Online, May 2, 2008). ✦

Correction

The editorial in the May 12, 2008, edition of Oil & Gas Journal contained an erroneous figure for the US Energy Information Administration's estimate of the benefit to independent oil and gas producers of the excess of percentage vs. cost depletion in tax accounting (p. 19). The correct figure is $790 million.

Letters

Maximizing gasoline volume

The huge and growing gasoline demand dictates that refiners maximize gasoline volume. After maximizing component volumes and meeting octane and other specs with minimum give-away, what else can be done?

One way to get a few more barrels is to optimize blending to get the highest octane blending values possible while meeting all the specs. This will allow slightly lower reforming severity, giving a slight increase in volume. However, the blending linear program will not achieve this goal if inaccurate blending values are used.

Use of refinery blend data is almost guaranteed to produce inaccurate blending values relative to octane (incremental blending values). One reason is narrow composition ranges which multiply extrapolation errors. Another is inaccuracy of octane numbers which can be expected in refinery operation. A third reason is high correlation between component percentages, which leads to large compensating errors. This results in misleadingly good prediction accuracy, when the incremental blending value is too high for component A and too low for component B.

Accurate incremental blending values can be obtained in well-conducted laboratory blending studies. If appropriate people are not available to plan and carry out such a study, a generalized octane blending program is available.[1]

When there is space in the gasoline for normal butane, a slight increase in volume might be available by maximizing use of normal butane in the low aromatic grade while using isopentane in the high aromatic grade.[2]

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Consultant
Wilmington, Del.

1. www.gasolineblendingplus.com.
2. OGJ, Mar. 3, 2008, p. 56.

Calendar

✦ Denotes new listing or a change in previously published information.

OIL&GAS JOURNAL online

Additional information on upcoming seminars and conferences is available through OGJ Online, Oil & Gas Journal's Internet-based electronic information source at http://www.ogjonline.com.

2008

MAY

Middle East Refining and Petrochemicals Conference & Exhibition, Bahrain, +973 1755 0033. +973 1755 3288 (fax), e-mail: mep@oesallworld.com, website: www.allworldexhibitions.com. 25-28.

Society of Professional Well Log Analysts (SPWLA) Annual Symposium, Edinburgh, (713) 947-8727, (713) 947-7181 (fax), website: www.spwla.org. 25-28.

SPE International Oilfield Corrosion Conference, Aberdeen, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 27.

SPE International Oilfield Scale Conference, Aberdeen, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 28-29.

The CIS Oil and Gas Summit, Paris, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: l.hannant@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk/summit8/summit8register.html. 28-30.

JUNE

ERTC Management Forum, Copenhagen, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 2-4.

Caspian Oil & Gas Exhibition & Conference, Baku, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 3-6.

Oklahoma Independent Petroleum Association (OIPA) Annual Meeting, Dallas, (405) 942-2334, (405) 942-4636 (fax), website: www.oipa.com. 6-10.

SPEE Society of Petroleum Evaluation Engineers Annual Meeting, Hot Springs, Va., (713) 651-1639, (713) 951-9659 (fax), e-mail: bkspee@aol.com, website: www.spee.org. 7-10

PIRA Scenario Planning Conference, London, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 9.

Asian Geosciences Conference & Exhibition, Kuala Lumpur, +44 (0) 20 7862 2136. +44 (0) 20 7862 2119, e-mail: geoasia@oesallworld.com, website: www.geo-asia.com. 9-11.

Independent Liquid Terminals Association (ILTA) Annual Operating Conference & Trade Show, Houston, (202) 842-9200, (202) 326-8660 (fax), e-mail: info@ilta.org, website: www.ilta.org. 9-11.

SPE Tight Gas Completions Conference, San Antonio, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 9-11.

EAGE/SPE EUROPEC Conference & Exhibition, Rome, +31 30 6354055, +31 30 6343524 (fax), e-mail: eage@eage.org, website: www.eage.nl. 9-12.

ASME Turbo Expo, Berlin, (973) 882-1170, (973) 882-1717 (fax), e-mail: infocentral@asme.org, website: www.asme.org. 9-13.

PIRA London Energy Conference, London, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 10.

Asian Oil, Gas & Petrochemical Engineering Exhibition, Kuala Lumpur, +44 (0)20 7840 2100, +44 (0)20 7840 2111 (fax), e-mail: oga@oesallworld.com, website: www.allworldexhibitions.com. 10-12.

Global Petroleum Show, Calgary, Alta., (403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. 10-12.

IADC World Drilling Conference & Exhibition, Berlin, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 11-12.

PIRA Understanding Global Oil Markets Conference, London, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 11-12.

Asia's Subsea Conference & Exhibition, Kuala Lumpur, +44 (0)20 7840 2100, +44 (0)20 7840 2111 (fax), e-mail: subsea@oesallworld.com, website: www.subseaasia.org. 11-13.

Russia and CIS Oil & Gas Investment and Finance Forum, London, +44 (0)20 7878 6888, website: www.C5-Online.com/OilGasFinance. 16-17.

CIPC/SPE GTS Joint Conference, Calgary, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 16-19.

American Association of Professional Landmen (AAPL) Annual Meeting, Chicago, (817) 847-7700, (817) 847-7704(fax), e-mail: aapl@landman.org, website: www.landman.org. 18-21.

LNG North America Summit, Houston, (416) 214-3400, (416) 214-3403 (fax), website: www.lngevent.com. 19-20.

IPAA Midyear Meeting, Colorado Springs, Colo., (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org. 19-21.

PIRA Scenario Planning Conference, Houston, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 23.

API Tanker Conference, San Diego, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 23-24.

Purvin & Gertz Annual Asia LPG Seminar, Singapore, (713) 331-4000, (713) 236-8490 (fax), e-mail: glrodriguez@purvingertz.com, website: www.purvingertz.com. 23-26.

API Exploration & Production Standards on Oilfield Equipment & Materials Conference, Calgary, Alta., (202) 682-8000, (202)

Calendar

682-8222 (fax), website: www.api.org/events. 23-27.

PIRA Understanding Global Oil Markets Conference, Houston, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 24-25.

Russian Petroleum & Gas Congress, Moscow, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 24-26.

NEFTEGAZ Exhibition, Moscow, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 24-26.

PIRA's Globalization of Gas Study Conference, Houston, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 25.

PIRA Understanding Natural Gas Markets Conference, Houston, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 26-27.

Russian Oil and Gas Exports International Forum, Amsterdam, +44 (0)20 7878 6888, website: www.C5-Online.com/OilGasExport. 26-27.

World Petroleum Congress, Madrid, +34 91 745 3008, +34 91 563 8496 (fax), e-mail: info@19wpc.com, website: www.19wpc.com. June 29- July 3.

JULY

International Offshore & Polar Engineering Conference, Vancouver, (650) 254 2038, (650) 254 1871 (fax), e-mail: meetings@isope.org, website: www.isope.org. 6-11.

Annual Rocky Mountain Natural Gas Strategy Conference & Investment Forum, Denver, (303) 861-0362, (303) 861-0373 (fax), e-mail: conference@coga.org, website: www.coga.org. 9-11.

IADC Lifting & Mechanical Handling Conference & Exhibition, Houston, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 15-16.

Oil Sands and Heavy Oil Technology Conference & Exhibition, Calgary, Alta., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.oilsandstechnologies.com. 15-17.

AUGUST

ACS National Meeting & Exposition, Philadelphia, 1 (800) 227-5558, e-mail: natlmtgs@acs.org, website: www.acs.org. 17-21.

IADC/SPE Asia Pacific Drilling Technology Conference, Jakarta, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 25-28.

Offshore Northern Seas Exhibition & Conference, Stavanger, +47 51 59 81 00, +47 51 55 10 15 (fax), e-mail: info@ons.no, website: www.ons.no. 26-29.

Summer NAPE Expo, Houston, (817) 306-7171, (817) 847-7703 (fax), e-mail: info@napeexpo.com, website: www.napeonline.com. 27-28.

SEPTEMBER

Annual India Oil & Gas Review Symposium & International Exhibition, Mumbai, (0091-22) 40504900, ext. 225, (0091-22) 26367676 (fax), e-mail: oilasia@vsnl.com, website: www.oilasia.com. 1-2.

China Power, Oil & Gas Conference & Exhibition, Guangzhou, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.chinasenergyfuture.com. 2-4.

ECMOR XI-European Mathematics of Oil Recovery Conference, Bergen, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 8-11.

IADC Drilling HSE Europe Conference & Exhibition, Amsterdam, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 9-10.

Rocky Mountain GPA Annual Meeting, Denver, (918) 493-3872, (918) 493-3875 (fax), email: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 10.

API Fall Refining & Equipment Standards Meeting, Los Angeles, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 15-17.

Rio Oil & Gas Conference & Expo, Rio de Janeiro, 55 21 2112 9078, 55 21 2220 1596 (fax), e-mail: riooil2008@ibp.org.br, website: www.riooilegas.com.br. 15-18.

API/NPRA Fall Operating Practices Symposium, Los Angeles, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 16.

GEO India South Asia's Geosciences Conference & Exhibition, New Delhi, +44 (0)20 7840 2100, +44 (0)20 7840 2111 (fax), e-mail: geo@oesallworld.com, website: www.geo-india.com. 17-19.

SPE Annual Technical Conference & Exhibition, Denver, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 21-24.

ERTC Petrochemical Conference, Cannes, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. Sept. 29- Oct. 1.

International Pipeline Exposition, Calgary, Alta., 403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. Sept. 30-Oct. 2.

Unconventional Gas International Conference & Exhibition, Ft. Worth, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.unconventionalgas.net. Sept. 30-Oct. 2.

OCTOBER

NPRA Q&A Forum, Orlando, Fla., (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npra.org. 5-8.

GPA Houston Annual Meeting, Kingwood, Tex., (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessor.com. 7.

KIOGE Kazakhstan International Oil & Gas Exhibition & Conference, Almaty, + (44) 020 7596 5000, + (44) 020 7596 5111 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 7-10.

IADC Drilling West Africa Conference & Exhibition, Lisbon, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 8-9.

International Gas Union Research Conference, Paris, +31 50 521 30 78, +31 50 521 19 46 (fax), e-mail: igrc2008@gasunie.nl, website: www.igrc2008.com. 8-10.

ERTC Lubes and Additives Conference, Berlin, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 13-15.

Middle East Plant Maintenance Conference, Abu Dhabi, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: d.michalski@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 13-15.

API Fall Petroleum Measurement Standards Meeting, Long Beach, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 13-17.

Central and Eastern European Refining & Petrochemicals Roundtable, Warsaw, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: c.taylor@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 14-16.

ISA EXPO, Houston, (919) 549-8411, (919) 549-8288 (fax) website: www.isa.org. 14-16.

Oil & Gas Transportation in the CIS & Caspian Region Conference, Moscow, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: j.golodnikova@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk/cispipes10register.html. 14-16.

PIRA New York Annual Conference, New York, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 16-17.

Petchem Arabia Conference, Abu Dhabi, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: c.verma@theenergyexchange.co.uk, web site: www.theenergyexchange.co.uk. 20-22.

SPE Asia Pacific Oil & Gas Conference & Exhibition, Perth, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 20-22.

SPE International Thermal Operations & Heavy Oil Symposium, Calgary, Alta., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 20-23.

Permian Basin International Oil Show, Odessa, Tex., (432) 367-1112, (432) 367-1113 (fax), e-mail:

pbioilshow@pbioilshow.org, website: www.pbioilshow.org. 21-23.

AAPG International Conference & Exhibition, Cape Town, (918) 560-2679, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org. 26-29.

Biofuels Conference, Berlin, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: c.taylor@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 28-30.

SPE Russian Oil & Gas Technical Conference & Exhibition, Moscow, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 28-30.

Arab Oil & Gas Show, Dubai, +971 4 3355001, +971 4 3355141 (fax), e-mail: info@icedxb.com, website: www.ogsonline.com. 28-30.

IADC Contracts & Risk Management Conference, Houston, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 29-30.

NOVEMBER

ASME International Mechanical Congress & Exposition, Boston, (973) 882-1170, (973) 882-1717 (fax), e-mail: infocentral@asme.org, website: www.asme.org. 2-6.

Abu Dhabi International Petroleum Exhibition & Conference (ADIPEC), Abu Dhabi, website: www.adipec.com. 3-6.

Deepwater Operations Conference & Exhibition, Galveston, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.deepwateroperations.com. 4-6.

North African Oil and Gas Summit, Vienna, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: c.brown@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk/nas3register.html. 4-6.

Mangystau International Oil & Gas Exhibition, Aktau, + (44) 020 7596 5000, + (44) 020 7596 5111 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 5-7.

GPA North Texas Annual Meeting, Dallas, (918) 493-3872, (918) 493-3875 (fax), email: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 6.

IADC Annual Meeting, Paradise Valley, Ariz., (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 6-7.

SEG International Exposition and Annual Meeting, Las Vegas, (918) 497-5542, (918) 497-5558 (fax), e-mail: register@seg.org, website: www.seg.org. 9-14.

IPAA Annual Meeting, Houston, (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org. 10-12.

Houston Energy Financial Forum, Houston, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.accessanalyst.net. 11-13.

American Institute of Chemical Engineers (AIChE) Annual Meeting, Philadelphia, (212) 591-8100, (212) 591-8888 (fax), website: www.aiche.org. 16-21.

ERTC Annual Meeting, Vienna, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 17-19.

IADC Well Control Middle East Conference & Exhibition, Muscat, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 24-25.

Annual European Autumn Gas Conference (EAGC), Cernobbio, Italy, +44 (0) 1737 855281, +44 (0) 1737 855482 (fax), e-mail: vanessahurrell@dmgworldmedia.com, website: www.theeagc.com. 25-26.

DECEMBER

Annual Refining & Petrochemicals in Russia and the CIS Countries Roundtable, Prague, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: e.polovinkina@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 2-4.

Downstream Asia Refining & Petrochemicals Conference, Singapore, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: a.ward@theenergyexchange.co.uk, website: www.wraconferences.com/FS1/dalregister.html. 3-4.

IADC Drilling Gulf of Mexico Conference & Exhibition, Galveston, Tex., (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 3-4.

Deep Offshore Technology International Conference & Exhibition, Perth, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.deepoffshoretechnology.com. 3-5.

International Petroleum Technology Conference (IPTC), Kuala Lumpur, +971 (0)4 390 3540, +971 (0)4 366 4648 (fax), e-mail: iptc@iptcnet.org, website: www.iptcnet.org. 3-5.

PIRA Natural Gas Markets Conference, New York, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 8-9.

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SPE Improved Oil Recovery Symposium, Tulsa, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 20-23.

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2009

JANUARY

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MARCH

GPA Annual Convention, San Antonio, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 8-11.

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Asian Biofuels Roundtable, Kuala Lumpur, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: a.ward@theenergyexchange.co.uk, website: www.wraconferences.com/FS1/AB1register.html. 24-25.

MAY

ACHEMA International Exhibition Congress, Frankfurt, +1 5 168690220, +1 5 168690325 (fax), e-mail: amorris77@optonline.net, website: http://achemaworldwide.dechema.de. 11-15.

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JUNE

Oil and Gas Asia Exhibition (OGA), Kuala Lumpur, +60 (0) 3 4041 0311, +60 (0) 3 4043 7241 (fax), e-mail: oga@oesallworld.com, website: www.allworldexhibitions.com/oil. 10-12.

OCTOBER

International Oil & Gas Exploration, Production & Refining Exhibition, Jakarta, +44 (0)20 7840 2100, +44 (0)20 7840 2111 (fax), e-mail: ogti@oesallworld.com, website: www.allworldexhibitions.com. 14-17.

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Climate cost study wanted

Sam Fletcher
Senior Writer

The Free Enterprise Action Fund (FEAOX) is pushing the ConocoPhillips board of directors to review and report the costs and benefits of company efforts to comply with climate change regulations.

Action Fund Management, the investment adviser to FEAOX, filed a proposal asking ConocoPhillips to prepare by next year a report as to how its actions have reduced global temperatures or helped avoid weather-related disasters. "Given that global warming regulation could significantly harm the company's earnings, this failure on the part of the board to conduct the necessary due diligence may leave them open to liability for breach of fiduciary duty," said FEAOX in a May 14 statement. It accused ConocoPhillips of "lobbying for greenhouse gas (GHG) regulation."

Last year ConocoPhillips joined the US Climate Action Partnership, a coalition of 33 US companies and nonprofit environmental groups, to recommend prompt enactment of US legislation to slow, stop, and reverse the growth of greenhouse gas. "In our view, the climate change challenge will create more economic opportunities than risks for the US economy," said ConocoPhillips.

In the past, the lion's share of stockholder proposals listed in energy company proxies have been from representatives of special interest groups with a populist or liberal bent—for the environment and employee input in corporate decisions, against apartheid in Africa and human rights violations in host countries.

FEAOX marches to a different drum, however—one with a conservative economic beat. Founded in 2005, it is described by proponents as "the first mutual fund dedicated to providing both financial and pro-free enterprise ideological returns to investors." It is headed by Steven J. Milloy, who also runs the blog junkscience.com and is a commentator for FoxNews.com. Tom Borelli, former head of corporate scientific affairs for Philip Morris, is portfolio manager for the fund.

But critics say FEAOX appears to be a lobbying enterprise masquerading as a mutual fund. Opponents accuse Milloy of being an advocate for the tobacco and oil industries because of his attacks on scientific links of secondhand smoke to health risks and human activity to global warming.

ConocoPhillips confrontation

Prior to election of officers at ConocoPhillips's annual meeting May 14 in Houston, Borelli asked Chief Executive James J. Mulva, "When you made the decision to lobby for cap and trade [a system for reducing carbon dioxide emissions], did you conduct good proper due diligence in terms of a cost-benefit analysis of what this would mean to shareholders, and did you discuss it with the board?" With Mulva up for reelection to the board, Borelli said, "This directly has to do with you."

Mulva replied, "Yes, we discussed the economic consequences of climate change, global warming, and all of our investments, all of our operations." Borelli then asked to see the minutes of those discussions. Mulva offered to meet with him after the meeting.

"Yes, we met very briefly. I'm going to meet with him or his staff at a later date," Borelli told OGJ. "It's clear to me that their support of carbon caps will only harm the business. Carbon fears are already harming its investment in tar sands. Federal law now prohibits the US government from purchasing oil from tar sands because it releases more carbon dioxide than from oil wells. Also, his [Mulva's] support of cap and trade did not stop the social activist shareholders from complaining about drilling for oil."

A ConocoPhillips representative said the firm "has called for a national mandatory framework to address GHG emissions, and we're actively engaged in the issue." He said such a framework must include the following:

- Mandatory approaches to reduce GHG emissions from the major emitting sectors.
- Flexible approaches to establish the cost of carbon, market-based incentives, performance standards, incentives for technology, etc.
- Approaches that create incentives and encourage actions by other countries to implement GHG emission reduction strategies.

FEAOX's proposal requiring a report on the cost and benefits of compliance with climate change regulations was defeated by 81% of the votes. By comparison, a proposal for adoption of quantitative goals for reducing GHG emissions lost by 59%.

Meanwhile, Milloy has a proposal pending for ExxonMobil Corp.'s annual meeting May 28 in Dallas to eliminate "nuisance proposals" by shareholders pushing political or social agendas. He wants a change in the company's bylaws to require board approval before such proposals—including his—can be included in proxies. ✦

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Editorial

Saudi oil and Congress

Oil consumers have reason to feel relieved that Saudi Arabia hasn't increased production by more than the 300,000 b/d now widely disparaged as inadequate. They also have reason to cringe after the latest energy abomination from the US Congress: passage by the House of a bill empowering the Department of Justice to take antitrust action against the Organization of Petroleum Exporting Countries.

Yes, the market needs more oil. But it needs lighter and sweeter crude oil than what will become available from any immediate Saudi production hike. The market also needs enough production potential in reserve to meet demand surges and supply disruptions. And consumers need energy governance based, for a change, on an adult view of these complexities.

Too small?

US President George W. Bush received news of the Saudi production increase on May 16 during a visit to Riyadh at which a request for more oil topped the agenda. Most analysts deemed the increase too small to reverse the recent surge in crude oil prices. Indeed, on the day of the announcement, the futures price of light, sweet crude set yet another record. It has increased since then.

The price increase can be seen as substantiating the inadequacy of Saudi Arabia's gesture. So suspicion builds that the desert kingdom is restricting supply to drive up the price of oil—suspicion manifest in the heavy margin by which the House approved antitrust litigation against OPEC. But a different explanation deserves notice.

A production increase of 300,000 b/d may be all Saudi Arabia could have implemented without spooking the market and driving up prices even more. The Saudis have a longstanding policy of holding 1.5 million b/d of production capacity idle as a supply buffer. This is deliberate production restraint. But it helps consumers by providing a measure of market stability.

According to International Energy Agency and US Energy Information administration data for April, the new output increase pulls spare Saudi production capacity close to the 1.5 million b/d minimum. Idle capacity scattered elsewhere in the world, all within OPEC, totals 500,000-800,000 b/d after deductions for countries where political unrest makes production hikes improbable. The total is barely enough to cover loss of production from, say, Venezuela or Nigeria. The market stays jumpy when spare production capacity is this low. A production hike much greater than 300,000 b/d would have brought the important Saudi buffer below its floor level and legitimately alarmed traders.

Another reason the Saudi increase didn't lower reported oil prices is that marker crudes—the ones that make headlines—are the light, sweet oils that the market increasingly craves and not the heavy, sour oil available from incremental Saudi production. To sell the new oil, the Saudis will have to discount it enough to encourage purchases for storage. The price effect will be a widening of the spread between low and high-quality grades. The volumetric effect will be a shift in low-value oil from one market cushion, idle production capacity, to another, inventories. The jump in marker prices after the Saudi announcement makes evident that the market considers a reduction in spare production capacity more significant than low-value oil headed for storage.

Relaxation in sight

Relaxation of this anxiety is in sight. Production capacity will increase soon as major projects come on stream in Saudi Arabia and other members of OPEC. For consumers distressed by high oil prices, this is excellent news. Increased supply and expansion of market buffers are essential to price relief. And global demand growth is slowing.

The market will need even more new supply in the future—supply that will result from investments planned now. With its misguided bill targeting OPEC for antitrust harassment, Congress has given group members a strong reason to chill their investments. Lower investment means lower future supply in a market under pressure, from population growth and industrialization, to expand. The combination is a formula for oil prices higher than they would be if Congress acted as though it knew something about the oil market and genuinely cared about the interests of consumers. ✦

Competition reshaping African deal structures

Uchenna Izundu
International Editor

With a reform effort under way in its premier oil producer and with production climbing elsewhere in the region, Africa remains a prime target for international oil and gas investment. But deal structures are changing as national oil companies (NOCs) compete for opportunities and independent producers move into areas once considered realms of major international oil companies (IOCs).

Last year, Africa's production of crude oil and condensate increased by an estimated 3.3%, making it the world's second-fastest region for production growth behind Eastern Europe, including the Former Soviet Union, in OGJ's Worldwide Production Report (OGJ, Dec. 24, 2007, p. 22). Africa's production was 9.244 million b/d. Output rose in Angola, Sudan, and Tunisia but fell in region-leading Nigeria by 2.4% because of attacks on pipelines.

As it is elsewhere in the world, an emphasis on gas is gaining in Africa, which, according to some analysts, will account for 25% of LNG export capacity by 2010. Equatorial Guinea joined Algeria, Egypt, and Nigeria as an LNG exporter last May, and Angola hopes to deliver its first cargo in 2012. Nigeria has begun an aggressive program to increase natural gas production and revenues from it.

Independents and NOCs

Competition for African exploration and production rights has intensified with the influx of independents and NOCs.

High oil prices and attractive fiscal terms and incentives have attracted independent producers to frontier areas, such as Tullow Oil in Ghana and Uganda (see story, p. 22).

State-owned Chinese companies have acquired assets in Nigeria by offering soft loans, military supplies, and construction of transportation systems. These deals illustrate NOCs' aggressive expansion strategies.

One independent producer based in London has moved into Nigeria by emphasizing local relations. A spokesman for Afren PLC told OGJ that its success in Nigeria, where it holds interests in seven offshore and onshore tracts, is that it is staffed by nationals and is therefore recognized as a local company.

"We have worked very hard to build community relations through scholarships and building schools," he said. It also helps that, as a small company, Afren can make decisions quickly. The company is assessing domestic gas production and long-term LNG projects in partnership with E.ON Ruhrgas and African LNG.

In response to the competition,

major companies are entering innovative deals.

Eni SPA, on May 19 reported a multifaceted agreement with Congo (Brazzaville) that it described as a "new integrated model of cooperation." The deal calls for investment of $3 billion and covers development of an expected 150 million boe of equity production during 2008-11, including tar sands and biofuels. Eni also will build a 300-450 Mw gas-fired power station near the Djeno oil terminal and will help with Congo's infant health-care program in rural areas.

The floating production, storage, and offloading vessel for BP PLC's Greater Plutonio complex off Angola, shown before tow-out, can store 1.77 million bbl of oil, process 240,000 b/d of oil, and handle 400 MMscfd of gas.

The tar sands agreement provides for exploration and development of two areas called Tchikatanga and Tchikatanga-Makola covering a combined 1,790 sq km. Eni said preliminary study of a 100-sq-km area indicates potential recoverable oil volumes of 2.5 billion bbl unrisked and 500 million bbl risked.

The areas are near M'Boundi oil field, associated gas from which might supply a heavy-oil upgrading plant based on proprietary Eni technology.

For biofuels, Eni signed a memorandum of understanding for collaboration in the use of palm oil for production of biodiesel. The project involves palm-tree cultivation on 70,000 unfarmed hectares in the Niari region in the northwestern part of the country. It's expected to produce 340,000 tonnes/year of crude palm oil for domestic food supply and production of 250,000 tonnes/year of biodiesel.

Eni's power-plant deal includes development of 56 million boe of gas reserves and associated liquids, with production net to Eni's interest of 22,000 boe/d.

Nigerian production

International attention on Nigeria's oil production problems has tended to obscure the country's reform efforts and new emphasis on gas. While real, those problems may be easing.

Nigeria's oil output has fallen by 265,000 b/d because of work stoppages and attacks on oil facilities in the Niger Delta. Facilities in production averaged 1.85 million b/d, far short of the country's Organization of Petroleum Exporting Countries quota of 2.16 million b/d of crude oil.

But high oil prices offset the economic effects of the disruptions. Goldman Sachs has predicted that Nigeria's export revenues will surge to $92 billion in 2008, assuming production of 2 million b/d and an oil price of $150/bbl by yearend.

According to Emmanuel Uduaghan, executive governor of Delta state, operators have repaired equipment, and kidnapping of oil employees in his state has ceased. The state has implemented a development and security strategy to provide training opportunities and build transport systems and power generation via public and private partnerships.

"Oil workers are travelling by boat instead of airplanes, which shows that things have improved," Uduaghan said. He urged oil companies to enlarge the local workforce to help Niger state residents benefit from petroleum development.

Nigerian gas plan

Although Nigeria has gas reserves estimated at 184 tcf, seventh highest in the world, and a gas resource estimated at 600 tcf, exploration oriented to gas has been rare. The government wants that to change, hoping to realize as much revenue from gas as it does from oil by 2010.

A "gas master plan" under development for 6 years offers operators new investment opportunities, responding to projections of 20-25% growth in domes-

Ghana due first oil output in 2010 with Jubilee start-up

Uchenna Izundu
International Editor

Tullow Oil PLC will make history when it delivers first oil from Jubilee oil field off Ghana in 2010 through a floating production, storage, and offloading vessel.

Oil exploration in Ghana began in the late 1890s, and there have been numerous oil and gas seeps in the Half Assini area. Until Jubilee, however, no significant discoveries had been made.

The field, discovered last year in 1,500 m of water and estimated with 90% probability to hold 170 million bbl of recoverable oil, straddles the boundary between the West Cape Three Points Block operated by Kosmos Energy and Tullow's Deepwater Tano Block. Tullow is the field operator.

Jubilee's ultimate upside potential is estimated to be 1.8 billion bbl. The first appraisal well, Mahogany-2, which reached a TD of 3,443 m on the West Cape Three Points license, targeted Turonian turbidite sandstones and suggests the field is a continuous structure that could be straightforward to develop. Tullow is testing flow rates into July to determine potential production rates and to collect oil samples for analysis. Mahogany-2 will be suspended for use as a potential development well.

The Hyedua-2 and Mahogany-3 wells, which will be drilled later in the year, will test the updip and the southeastern extents of Jubilee.

Moses Boateng, managing director of Ghana National Petroleum Corp., said the FPSO would have a processing capacity of 60,000 b/d of oil and 80 MMscfd of gas with a minimum of 1 million bbl of storage for the first phase of development. Minimum water injection would be 100,000 b/d from the start, and the gas produced would be reinjected or transported to shore for power generation.

GNPC is carrying out a gas-market survey to determine domestic requirements. The FPSO's capacity could be upgraded to about 120,000 b/d and 170 MMscfd.

Ghana's politicians have stressed their determination to overcome the economy-distorting "resources curse" as their country becomes an exporter of an as-yet unknown amount of oil.

The government has launched a Gas Oil Forum to gather ideas on how it can regulate and manage its oil discovery to promote economic growth and sustainable development. It has received advice on these issues from the British and Norwegian governments.

tic gas use driven by power generation and industrial development. The government has launched its Domestic Gas Supply Obligation (DGSO) with an immediate effect requiring operators to set aside gas production for local markets.

Emmanuel Odusina, Nigeria's gas minister, told OGJ that the allocation varied among companies, depending on three variables: reserves, amount of gas used commercially, and amount of gas flared. Essentially, the company having the greatest volumes of gas would contribute the most to the domestic market.

Odusina is gathering comments from companies on their obligations in line with their supply plans. About 1 bcfd of gas is expected to be allocated to the market initially, growing to 4-5 bcfd over 5 years.

Nigeria is determined to develop its local, regional, and export markets concurrently, although preference to date has been given to exports. Expansion of Nigeria LNG to a seventh train is under development, and other projects such as Brass and OK LNG are being evaluated.

One senior LNG executive said exports and domestic gas supplies were compatible goals. But more gas exploration will be needed.

David Ige, group general manager and senior technical advisor at Nigeria National Petroleum Corp. (NNPC), said the government wanted to make local, regional, and export markets equally attractive. By 2011 domestic gas prices should be on par with export values.

Nigeria has limited pipelines and processing facilities and has invited investors to spend $20-30 billion under its gas infrastructure blueprint (OGJ Online, May 6, 2008). Investors are to develop bid proposals by Dec. 15, 2008, for evaluation by the government in next year's first quarter. Investments are expected to begin in April 2009.

Gas blueprint

Under the scheme envisioned by Nigeria's gas blueprint, wet gas from oil fields in the Niger Delta will be processed in three central processing facilities (CPFs). Lean gas will be transported through a transmission line network to markets, and liquids will be stored for local use or exported.

The government is requesting CPFs in West Delta (Warri/Forcados area), Obiafu (North Port Harcourt), and the Akwa-Ibom/Calabar area. It also wants three gas pipeline transmission systems, including compressor stations:

- A 1,135-km, 48-in. diameter south-north pipeline between Akwa-Ibom in Calabar state and Kaduna via Abuja. It will have a capacity of 3 bcfd and will deliver gas to eastern, central, and northern Nigeria. This line also would carry about 2 bcfd of gas for the proposed Trans-Sahara Gas Pipeline. South Korean investors have committed $5 billion to building the 1,200-km Ajaokuta-Kano link as part of their acquisitions of the Oil Prospecting License 321 and 323 areas in 2006. Pipeline operations are expected to start in 2013. The government is looking for investors to construct the Calabar-Ajakuta leg.
- A 700-km, 42-in. western pipeline system that would link the exist-

ing Escravos-Lagos pipeline system to Shagamu with a 200-km offshore extension. The proposed capacity is 1.3 bcfd. The system would extend to Jebba with a spur serving the OK LNG plant.

• A 200-km Interconnector system between the Obiafu CPF and Ajaokuta to deliver gas from the east to the western and north-south transmission systems. It would have a capacity of 1.7 bcfd.

Ige told OGJ that, although NNPC was undergoing reform, it was also examining these gas opportunities and would invest as appropriate.

"There is no compulsion for investors to team with NNPC," he said. "Our decisions will be commercial ones."

But potential operators are worried about the effectiveness and independence of the proposed gas regulator under industry reforms.

Another issue is risk mitigation because supply would come from the troubled Niger Delta. The impact of Nigeria's gas policy regime is still to be clarified for existing and proposed projects.

Tony Chukwueke, director of the Department Petroleum Resources (DPR), said third-party access was a major priority under the gas master plan and would be obtained through government-facilitated agreements. "Companies can get access to gas that is being flared, pay existing operators to produce gas on your behalf, or produce it yourself," he said. The DPR and oil companies are discussing flaring targets.

Petroleum reforms

With changes starting in June, Nigeria's revamp of its petroleum industry aims to improve efficiency and eliminate conflict of interests among agencies, said Emmanuel Egbogah, petroleum advisor to the president.

NNPC is often criticized for delaying projects due to bureaucracy and managers fearing blame if decisions backfire. The reforms are expected to take up to 2 years to fully implement.

The government is considering partially privatizing NNPC.

African producers grapple with issues of transparency

Uchenna Izundu
International Editor

Despite billions of dollars in revenue from oil exports, many African oil-producing countries continue to suffer poverty and disease, largely due to corruption, conflict, and mismanagement. Part of the solution, according to many analysts, is broader disclosure of oil revenues—or transparency.

African national oil companies (NOCs) need to improve the transparency of their revenues in their home territories compared with their activities abroad, according to Juanita Olaya, revenue transparency program manager at the anticorruption group Transparency International (TI).

"There is a huge difference between companies that have an anticorruption practice and those on stock exchanges and those that are not. None of the NOCs are listed unless they operate abroad to seek capital so they need regulation within their own home countries to make them operate better when it comes to revenue transparency," she told OGJ.

Because of inconsistent reporting, information on oil revenue often is difficult to obtain, interpret, and compare across companies and countries.

According to a recent TI report ranking 42 international oil companies (IOCs) and NOCs in the transparency of revenue reporting based on publicly available data, Nigerian National Petroleum Corp. and Algeria's Sonatrach are middle-level performers that disclose relatively little about revenues and anticorruption programs. They need to increase their reporting on policy and management systems as well as all areas of revenue transparency, TI said.

GEPetrol (Equatorial Guinea), Societe Nationale des Petroles du Congo (Congo-Brazzaville), and Sonangol (Angola) were among the worst performers, lacking disclosures on payments and anticorruption efforts. "Further improvement for this group requires increased reporting on all areas of revenue transparency at all levels of implementation," TI said.

Reasons for poor disclosure included confidentiality clauses and difficult environments, but Olaya called upon all companies in this group to negotiate for transparency.

However, the International Association of Oil & Gas Producers criticized the methodology and data by TI for its report. "Much of this was proprietary and irrelevant to the issue of transparency," the association said.

In February, Conger (former Zaire), Equatorial Guinea, Madagascar, Congo (Brazzaville), and Sao Tome and Principe became candidates for the Extractive Industries Transparency Initiative (EITI), launched in 2002 as a program whereby companies voluntarily publish what they pay and governments disclose what they receive.

As candidates, the nations must publish a fully costed work plan agreed with other stakeholders. The next stage will be full compliance with the EITI through dissemination of the information on revenues.

"We want to make ownership more spread out amongst Nigerians," Egbogah said. "And the government would have no less than 40%. Then it would be a business enterprise with reduced interference by the government."

A national energy council, chaired by the president, will be formed to set policy. Operators will answer to the Petroleum Inspectorate Commission, the technical and commercial regulator of the upstream business that would subsume the current DPR.

Egbogah told OGJ that a new National Petroleum Research Center comprising representatives from different oil companies would address specific industry problems, integrate technology development programs, and offer technical consultancy and laboratory services.

Under the reform, NNPC would become an operating company, named National Oil Co. (NAPCON), and would forgo its present regulatory and policy-making functions (OGJ Online, May 9, 2008).

"It will focus on how to make itself competitive both domestically and internationally with its own capital from international and local markets," Egbogah said. Basic business units will be incorporated joint ventures instead of joint ventures. The change would enable NAPCON to secure funding from the market instead of relying on the government.

NNPC is looking for an additional $3.8 billion this year to meet its JV commitments. The government has provided $4.9 billion. On May 20, NNPC signed upstream finance deals with Total SA and Mobil Producing Nigeria (MPN) for a total of $3 billion. The loans will help the government reach its target for domestic gas needed for power projects and local industrial development.

According to the agreement with Total, NNPC will borrow $1 billion and pay back the loan with cash rather than crude oil as in the past. Similar terms were reached with Mobil, but the sum is $2 billion.

Angola's growth

Elsewhere in Africa, Angola has overtaken Libya as the region's second most prolific oil producer.

At 1.695 million b/d last year, the country's output was up 20% from the 2006 level. Libya's 2007 production was down slightly at 1.7 million b/d. In February, the latest month for which data are available, Angola's production averaged 1.919 million b/d and Libya's, 1.76 million b/d (OGJ, May 12, 2008, p. 62).

Angola's production is predomi-

nantly from deep water, however, with thick salt layers and diapirs complicating technical problems.

At present, Angola has 21 deepwater fields on production. Start-ups within the last year include BP PLC's Greater Plutonio complex on Block 18 and ExxonMobil Corp.'s Kizomba C on Block 15. Next year, Chevron Corp.'s Tombua and Landana fields on Block 14 are scheduled to start production, which will hit 100,000 b/d. And in 2011 Total SA's Pazflor on Block 17 is expected to produce first oil.

Speaking at the Offshore Technology Conference in Houston, Graeme Stewart, the Resource Development Manager for BP in Angola, said seismic imaging, subsea acoustic monitoring, and real-time downhole data were key to successfully starting Greater Plutonio. The field has 43 wells: 20 producers, 20 water injectors, and 3 gas injectors.

Steward said "world-class seismic" provided "very clear imaging of the subsurface," which he called "absolutely critical to targeting wells."

The US Energy Information Administration expects Angolan oil production to peak at around 2.5 million b/d in 2011 and fall to 2.4 million b/d by 2013.

Analysts worry about how Angola's joining OPEC at the beginning of 2007 will affect production.

Syanga Abilio, vice-president of state-owned oil company Sonangol, told OGJ: "We joined the institution that works to protect price, and it was important to be part of that. We were an observer at OPEC for a long time. We have a quota of 1.9 million b/d, but that does not bind us on further exploration and production. We had our oil infrastructure destroyed during our civil war, and there is nothing to fear with future investment."

Spiraling costs are a major problem for operators in Angola. According to Chris Brown, West African analyst at Wood Mackenzie, Edinburgh, projects under development in Angola could, at $30-40 billion, be double the cost of those now on stream. Pointing out that Angolan production-sharing contracts are based on internal rate of return, Brown said, "Much of the upside is taken by the country; thus, if development costs are high, Sonangol will lose a higher percentage, but both company and country will lose out."

Angola's latest licensing round attracted interest from 200 oil companies in 10 blocks: the onshore Cabinda Centro Block in the Cabinda Centra basin and KON11 and KON12 in the Kwanza basin; shallow-water Block 9; deepwater Blocks 19, 20, and 21; and ultradeeepwater Blocks 46, 47, and 48. The government has prequalified 40 companies and suspended its block-proposal deadline while it evaluates applications by private Angolan companies.

Angolan LNG

Angola's focus so far has been oil, but natural gas is also of growing importance with the development of Angola LNG and the formation of Sonangas, a subsidiary of Sonangol that will focus on gas development.

The Congo basin holds the best potential for gas. Sonangol's Abilio said Sonangas is mapping and interpreting geological information and plans to drill a well by the end of the year.

Angola LNG will gather otherwise-flared gas to produce 5.2 million tonnes/year of LNG targeting the US Clean Energy terminal near Pascagoula, Miss., in 2012. Associated and nonassociated gas will come from Blocks 15 (ExxonMobil); 17 (Total); 18 (BP); and 0 and 14 (Chevron Corp.). The partners will also develop previously discovered nonassociated gas fields on Blocks 1 and 2 to supplement the gas produced with oil. The plant will also process 125 MMcfd of gas for industrial projects. ✦

House passes bill to create oil antitrust task force within DOJ

Nick Snow
Washington Editor

The US House passed, by a vote of 324 to 84, a bill that would create a new oil antitrust task force within the Department of Justice. Supporters of HR 6074, which also would give DOJ authority to sue foreign oil cartels for violating US antitrust laws, included 103 Republicans, according to its sponsor Rep. Steve Kagen (D-Wis.).

"Until we finally have an energy policy other than drill-and-burn, this bill will begin to set things right for the American people," Kagan said following the vote. "We cannot drill or grow our way out of this energy crisis. We must begin to think differently in America. That includes loosening the stranglehold other nations have on our economy and exploring new forms of energy."

The new "Petroleum Industry Antitrust Task Force" would be charged with determining the existence and extent of gasoline price gouging, anticompetitive price discrimination by refiners, actions to inflate prices by constraining supplies, and possible oil price manipulation in futures markets, Kagen said.

The bill, which would amend the Sherman Antitrust Act, also requests a Government Accountability Office study on the effects on competition of prior oil industry mergers and divestitures, he indicated.

"This legislation will address the loopholes and exemptions that oil companies exploit at the great expense of our citizens," Kagen said. "By passing the Gas Price Relief for Consumers Act, the House agrees that it is time to give US authorities the ability to prosecute the anticompetitive conduct committed by international cartels that restricts supply and drives up prices."

Frequent investigations

Opponents disagreed when Kagan introduced the bill on May 19. "It seems that every year, Congress conducts a new investigation of the oil industry," said Rep. Steve King (R-Iowa). "By my estimation, in this House, committees have held no less than 20 hearings, and that's on gas prices. In the House Judiciary Committee alone, we've held two hearings just this year and there's another one scheduled for May 22," he added.

Gasoline prices have continued to rise despite such oversight, King continued. "As the Federal Trade Commission [FTC] has reported, changes in world oil prices have explained 85% of the changes in the price of gasoline in the US. The price of gas at the pump closely tracks the price of a barrel of oil in the world market. Further, the FTC has repeatedly found that there is no broad-based collusion to fix prices or engage in price gouging in the retail sale of gasoline."

This would be the second time the House considered a No Oil Producing and Exporting Cartels (NOPEC) bill, which would attempt to change the Act of State doctrine and the concept of sovereign immunity, King said. "There is no certainty that enabling the attorney general to sue [the Organization of Petroleum Exporting Countries] for an antitrust violation will result in lower gas prices for Americans. Given the instability that such a suit might create in the world oil market, this legislation would be long on psychic compensation but short on actual returns to America's pocketbook," he maintained.

King urged House Democrats to consider bills that would authorize federal leasing on the Arctic National Wildlife Refuge's coastal plain and on more of the Outer Continental Shelf instead. "I recognize that this bill will likely pass the House again, but I urge the majority to quit with the cheap theatrics and easy votes," he said.

House leaders respond

House leaders responded to H.R. 6074's passage along party lines. "The House voted today with a strong bipartisan and veto-proof margin to hold foreign oil cartels and Big Oil accountable," Speaker Nancy Pelosi (D-Calif.) said.

The legislation gives DOJ "a critical tool to pursue antitrust actions against OPEC-controlled entities for fixing prices," creates a new oil industry task force within DOJ, and requires that major oil company mergers in recent years be examined for anticompetitive effects, she said.

"Instead of using a veto threat to shield cartels and Big Oil companies from accountability, the Bush administration should work with Congress to protect consumers," Pelosi said.

Minority Whip Roy Blunt (R-Mo.) said that with the price of oil nearing $130/bbl, consumers deserved more than warmed-over legislation seeking to authorize federal lawsuits against overseas oil producing nations.

"Unfortunately, what we saw today on the floor was more theatrical than substantive in nature," he declared. Republicans plan to offer proposals later in the week to produce more oil and refine more gasoline domestically, Blunt said. ✦

MMS prepares for 2008 hurricane season

Officials from the US Department of the Interior's Minerals Management Service participated in a media forum May 15 with representatives from the US Coast Guard and the American Petroleum Institute to discuss new final rules regarding enhanced information on hurricane conditions. The groups also discussed the design of offshore structures and the actions needed to reduce risk of severe damage to basic oil and gas structures in the Gulf of Mexico in the event of hurricanes this season.

MMS work in environmental and personnel safety proved worthy during the 2005 hurricane season, according to Walter Cruickshank, MMS deputy director. Before hurricanes Katrina and Rita passed through the gulf, a total of 748 platforms (93%) and 101 drilling rigs (75%) were evacuated safely with no personnel injuries.

Last month MMS published a new regulation, effective May 15, incorporating three API bulletins that impose more-stringent design and assessment criteria for new and existing structures in the gulf.

"Our belief is that this regulation will help increase the survivability of offshore infrastructure in the event of a storm," said Cruickshank. "We can say today that we are much better prepared than we were 3 years ago."

MMS launched a hurricane web site last year in an effort to better inform the public about evacuations, production shut-in statistics, historical information, and links to other federal agencies involved in hurricane preparation and response.

As part of the response effort, MMS has been testing its continuity of operations (COOP) plan this week. "COOP took place [May 15-16] and tested our ability to transition from our New Orleans region site to [Houston] and to handle the reporting of offshore evacuations and production shut-ins," explained Lars Herbst, MMS regional director, Gulf of Mexico region. He said the drill was a success.

Since Katrina and Rita, the Coast Guard has placed a liaison officer at MMS' COOP site to pass information between MMS and Coast Guard headquarters in New Orleans.

The Coast Guard's contingency plans are based on saving lives, being able to reopen critical ports and waterways, and responding to environmental damage, said Joel R. Whitehead, Coast Guard District 8 commander. ✦

Oil shale debate becomes 'chicken-or-the-egg' question

Nick Snow
Washington Editor

The question of "which comes first?" was dominant as oil shale development proponents told a US Senate committee May 15 that regulations need to be developed, and opponents said impacts need to be quantified.

"It seems to me that there should be a way forward that does not involve premature commercial leasing, that protects the interests of the American people and gives them a fair return on their resources, and that addresses concerns of local citizens but still provides industry with the certainty it needs," Energy and Natural Resources Committee Chairman Jeff Bingaman (D-NM) said.

Pete V. Domenici (R-NM), the committee's ranking minority member, noted that the 2005 Energy Policy Act (EPACT) contained a provision to facilitate oil shale development. "Unfortunately, last year, without the benefit of full debate and conference as we had in the 2005 energy bill, Congress placed a 1-year moratorium on preparing and publishing the final regulations for a commercial leasing program," he said.

Committee member Ken Salazar (D-Colo.) said he sought the delay because important provisions dealing with oil shale development, which were part of the 2005 energy bill that the Senate initially approved, were stripped out when the measure went to conference with the House.

Restore orderly process

Salazar said a bill he introduced on May 14 to amend EPACT "would restore an orderly process for the potential development of oil shale and tar sands in Colorado, Utah, and Wyoming and mirror the Senate-passed 2005 energy bill." It specifically would provide 1 year for federal completion of a programmatic environmental impact statement (P-EIS), an additional 90 days for governors of the affected states to comment, and 1year for a commercial leasing program to be developed once the P-EIS is complete.

S. 3019 also would require the US Bureau of Land Management (BLM) to report to Congress on the research and development program authorized under EPACT to identify available technologies for extracting oil from oil shale, proposed lease terms, and other conditions before any commercial leasing occurs. It also would authorize a National Academy of Science study on oil shale production's importance to the US, the status of R&D efforts, and probable environmental and socioeconomic impacts. Finally, it would require full compliance with the 1969 National Environmental Policy Act, including a site-specific EIS, before a commercial lease sale and any planned development.

"Absent the certainty that final regulations would bring, the commercial oil shale industry may not be willing to invest the necessary dollars for research..."
—C. Stephen Allred, Asst. US Interior Secy. for lands and minerals management.

"Colorado already has a huge level of oil and gas development, which is expected to increase twelvefold by 2015. This is why the governor [Bill Ritter Jr., who was a witness] and I want to move forward carefully, particularly in planning something like oil shale development on top of this," Salazar said during the May 15 hearing.

"I think the disagreement today involves the timing for developing the legal framework for leasing. We believe it should happen only when we know the water needs, the water resource impacts, and the energy needed to produce oil from oil shale," Ritter told the committee.

Unanswered questions

"I recognize that it could provide significant economic and employment opportunities for Colorado," Ritter continued, "but we believe we need to answer these unanswered questions. Providing certainty for potential developers is important, but only when we understand the impacts."

But another witness, C. Stephen Allred, assistant US Interior secretary for lands and minerals management, said EPACT's existing provision already provides the means for developing an environmentally sound and economically viable oil shale industry to help meet future US energy needs. "Accordingly, I would urge Congress to repeal the current prohibition on finalization of the oil shale regulations," he said.

He said EPACT Section 369 uses a three-pronged approach. First, it permits oil shale research development and demonstration projects to ensure that technologies can operate in an economically and environmentally acceptable manner before expanding to commercial-size operations. Second, it requires development of the PEIS to identify the most prospective federally-held oil shale areas in Colorado, Utah, and Wyoming. Third, it develops commercial oil shale regulations so companies can make research, development, and demonstration (RD&D) investment decisions now so that optimal processes are developed when the government is ready to move forward on commercial leasing.

"Each of these steps builds upon the other, and each is executed in an open, public process with full consideration and environmental concerns," Allred said. The moratorium was inserted into the US Department of the Interior's fiscal 2008 budget as part of the Omnibus Budget Reconciliation Act in December. While it keeps BLM from publishing final regulations, the agency plans this summer to publish proposed regulations, which will lay out a potential framework for possible commercial operations, he continued.

'May not invest'

"Absent the certainty that final regulations would bring, the commercial oil shale industry may not be willing to invest the necessary dollars for research, and this vast domestic resource will remain untapped at a time when our nation is searching for ways to further its energy security," Allred warned.

Extending the moratorium "may well have a chilling effect on our efforts to develop this resource in the future," added Terry O'Connor, vice-president for external and regulatory affairs at Shell Exploration & Production Co.'s unconventional oil division in Denver. The unit in 2006 received three 160-acre federal RD&D leases in Colorado's Piceance basin, where it plans to perform pilot tests of separate oil shale processes.

Each 160-acre research tract is surrounded by a preference right lease of about 5,000 acres. The lessee will earn the right to expand the surrounding preference right lease if it is able to show it is capable of producing commercial quantities of shale oil from the lease. This would be subject to payment of an undetermined conversion fee, which regulations presumably would establish, O'Connor said.

He acknowledged that Shell also holds three other large oil shale tracts in northeastern Colorado but said the deposits on two of them are better suited to retort technologies, which the company abandoned years ago, while the third, on which it has done small R&D tests, contains easily accessible but noncommercial deposits. Its current research focuses on groundwater protection, and it is conducting tests to determine if freeze wall technology, which the construction industry has used for years, can be used to help extract oil from oil shale using the in situ conversion process (ICP) it has developed.

"[My bill] would restore an orderly process for the potential development of oil shale and tar sands in Colorado, Utah, and Wyoming, and mirror the Senate-passed 2005 energy bill."
—US Sen. Ken Salazar (D-Colo.)

'Smartest kind of CCS'

"While we're aware that this ICP technology has a wide range of environmental benefits, it also requires a lot of energy," O'Connor said. "We're looking at a variety of options. Because we're looking at bringing only the light end out and leaving the heavier portion behind, we expect to practice the smartest kind of carbon capture and sequestration."

He told the committee that Shell hopes to know by yearend 2009 or early 2010 if its process is effective. "We're at a point where we need to go into an area where the oil shale is ideally configured to test our ICP technology. We need access to federal land to do that," he said.

"We believe [leasing] should happen only when we know the water needs, the water resource impacts, and the energy needed to produce oil from oil shale."
—Colorado Gov. Bill Ritter.

O'Connor conceded that no one fully knows what the impacts of commercial oil shale development would be because it has never occurred. But another witness, Steve Smith, assistant regional director of the Wilderness Society in Denver, said that a 2007 Rand Corp. study for the US Department of Energy found that producing 100,000 b/d from oil shale using the currently most advanced in situ heating retort would require 1.2 Gw of dedicated electricity.

"That equates to construction of a dedicated power plant equal in size to the largest coal-fired power plant now operating in Colorado. Such a plant would cost about $3 billion to build and would consume 5 million tons of coal each year, producing 10 million tons of greenhouse gases. A 500,000 b/d industry, the scale projected by some oil shale enthusiasts, would require five such plants generating 6 Gw of new power, an amount equal to that generated from all of Colorado's existing coal-fired power plants," he said in his written testimony.

Smith said that while some of the electricity might be come from gas produced as an in-situ process byproduct, most probably would require using abundant coal supplies in the vicinity. This would prompt additional technological challenges in providing carbon sequestration and controlling particulate air pollution, he indicated.

And then there's water

Water is an additional problem because the area is arid with relatively low annual rainfall and an existing overcommitment of water supplies and facilities, Smith continued. He said that the Rand report cites an estimate by the Office of Technology Assessment (which went out of business when Republicans took control of Congress in early 1995) that traditional oil shale operations could require 2.1-5.2 bbl of water for each bbl of shale oil product.

"While the new in situ processes may require relatively less water, the Rand report notes that 'considerable volumes of water may be required for oil and natural gas extraction, postextraction cooling, products upgrading and refining, environmental control systems, and power production,'" he said.

Local water agencies in the area have estimated that a 500,000 b/d oil shale industry would require 25,000 acre ft/year of water, either from new sources or diverted from existing uses, according to Smith. "Such supplies of water adequate for the newer oil shale technologies might not be available and, even if they are, might not remain available in a changing global climate," he said.

Ritter said Colorado is rapidly approaching its full allocation of Colorado River entitlements and soon will enter a new period of trading and sharing water among different users. "We do not know what the environmental impacts will be on both surface water and groundwater quality due to extraction operations, particularly when considering experimental in situ technologies," he said.

O'Connor responded that Shell will not proceed unless it can demonstrate that it can produce oil from oil shale without threatening Colorado's groundwater. "We've been able to demonstrate that this process works. The question now is whether it will work in a large commercial project. We need regulations and desperately need them now. It's not a coincidence that no one has developed oil shale commercially. The regulations have not been there," he told the committee. ✦

WATCHING GOVERNMENT

Nick Snow, Washington Editor

FTC has new book to throw

When he came before the Senate Appropriations Committee's Financial Services and General Government Subcommittee on May 14, Federal Trade Commission Chairman William E. Kovacic told the chairman, Richard J. Durbin (D-Ill.), exactly what he wanted to hear.

Noting that diesel fuel historically has been less expensive than gasoline at the retail level in an Apr. 23 letter to Kovacic, the senator said that the Energy Information Administration reported that week that diesel reached a record $4.14/gal national average compared to $3.51/gal for gasoline. "The growing price gap has never been wider," he said.

Two days before the hearing, EIA reported that diesel cost an average $4.33/gal and gasoline $3.72/gal. Durbin came to the hearing looking for answers from Kovacic and commission member Jon Leibowitz.

The FTC officials were there to testify about the agency's fiscal 2009 budget request. They spent much of their time answering questions from Republican as well as Democratic committee members about FTC efforts to monitor oil product prices.

'Facts, not anecdotes'

"If oil companies are making excessive profits and manipulating markets, let's throw the book at them. But let's base our actions on facts and not anecdotes," said Sam Brownback (R-Kan.), the ranking minority member.

Durbin said that the difference between crude oil and product prices has grown from $1-5/bbl to more than $40/bbl. "The crack spread for middle distillate and distillate fuel oil has grown dramatically. The spread for jet fuel has also grown," he said.

Other federal lawmakers have accused the FTC of not moving promptly to use oil market investigation authority it received under the 2007 Energy Independence and Security Act. Kovacic pointed out that on May 1 it sought public comments on how to interpret its new responsibility. "The 30-day comment period runs through June 6, and the commission anticipates concluding the rulemaking process this year," he said.

'Several scenarios'

"We intend to examine several scenarios, including the possibility of fraud in reporting pricing and transaction information. We'll also look at more traditional behavior such as collusion, but not antitrust issues which other agencies already examine," Kovacic continued.

The FTC also plans to study impacts following public announcements of refinery shutdowns and efforts to move products into and out of specific markets, Leibowitz added.

The FTC also intends to use resources the subcommittee gave it a year ago and work closely with its counterparts in other countries on this inquiry, the agency's chairman said. "There's no bigger issue for them, either," he said.

I asked Durbin after the hearing if he was satisfied that the FTC was using its new authority quickly enough. "That was the good news today. They obviously responded to our letter of 2 weeks ago. We'll keep in close touch as the process unfolds and offer suggestions when we think it's appropriate and necessary," he replied. ✦

Studies call for climate change policy from government

Paula Dittrick
Senior Staff Writer

Recent studies indicate that corporate pressure is building globally for lawmakers to address climate change.

More than 75% of companies surveyed in worldwide energy, utilities, chemical, forest products, metals, and mining industries are looking to policymakers for a clean, consistent framework on global emission targets, reported Accenture in a recently released study.

In a separate survey, conducted in the US, Deloitte LLP reported that 82% of consumers believe it's important for regulators to impose laws reducing greenhouse gas (GHG) emissions. Deloitte released its findings at the Deloitte Energy Conference in Washington, DC.

The Investor Network on Climate Risk on May 20 released a letter calling on the US Congress to set a target and timetable to reduce emissions. The network, directed by Ceres, represents about 60 institutional investors focused on the impacts of climate change on business. Ceres is a coalition of investors, environmental groups, and other public interest organizations working with companies to address sustainability issues.

"In the current unpredictable national climate policy environment, it is difficult and risky for businesses to justify the large-scale, long-term capital investments needed to seize existing and emerging opportunities to transition to a clean, low-carbon economy," said Investor Network.

"With the proper incentives and market conditions, we are confident that business opportunities could expand dramatically, low-carbon technologies that are available today could be broadly deployed, and significant reductions in emissions could be achieved over the next few decades," Investor Network said.

Accenture surveyed executives

Accenture surveyed more than 130 executives at energy, utilities, chemical, and natural resources companies in North America, South America, Europe, Asia, and Africa. The research was based on telephone interviews conducted from December through March.

Participating executives said that while they recognize their own role in addressing climate change, they look to politicians to initiate solutions by providing clear regulatory frameworks for business planners.

Asked which groups are most likely to influence long-term carbon emissions, 84% said politicians and policymakers, 71% said energy providers, and 64% said industrial users.

"Our research indicates that we are undergoing a tipping point on the topic of climate change, as governments, customers, investors, and employees are taking action—recognizing the inevitability of moving step-by-step toward a low-carbon or no-carbon economy," said Sander van't Noordende, group chief executive of Accenture's resources operating group.

Resources companies face fundamental opportunities regarding climate change strategies, participating in carbon and financial markets, and investing in the evolution of energy-related physical infrastructure, he said.

The opinions of executives differed by geography, with 73% of respondents in the European Union saying they regard GHG emissions as an inescapable part of their business compared with 37% of respondents based outside the EU.

"Resources companies in the EU countries regard their management of carbon emissions as an important element of corporate strategy and performance, not simply as a regulatory burden," Accenture said. Of EU respondents, 53% regard GHG emissions as a key operational metric compared with fewer than 40% in other regions.

The study noted that where a policy framework exists, companies are focused on investing and making money in a low-carbon economy. But companies faced with an evolving national policy are proceeding with measured responses.

"Regardless of the timing of policy implementation, resources companies need to understand and actively manage the other three main drivers of business success around climate change: customer attitudes, technology innovation, and new business models," Van't Noordende said.

Consumers, regulators mindful

Deloitte said recent concurrent surveys of state public regulators and US residential electricity consumers indicated that regulators expect the costs of producing electricity to be higher, while consumers would pay higher rates to help mitigate climate change.

In a survey of 50 state public utility regulators, 87% expect the costs of producing electricity to rise next year. Fuel prices were cited as the key contributing factor by 35%, while 23% cited environmental compliance, 21% cited capital costs, and 11% cited inflation.

In the consumer survey, 62% said they would be willing to pay 5% more on their electric bills to stop GHG emissions. When asked about specific technologies, 55% said they would pay 5% more to support clean coal technology.

Deloitte's consumer survey, based on telephone interviews with 1,000 adults, showed 82% of participants believe it's important for regulators to impose laws reducing GHG emissions, yet 45% did not know whether their state had passed such regulations.

Of state regulators surveyed, 83% said they are somewhat or very concerned with GHG emissions, and 70% indicated it was important to mandate reduced GHG emissions through state

regulation, Deloitte reported.

When asked to rank preferences for various GHG emissions-reduction technologies, regulators ranked nuclear power as the preferred technology, while energy efficiency technologies were second, renewable energy ranked third, and clean coal ranked last.

Nearly 90% of consumers surveyed, said they believe that increased consumer use of renewable energy sources, such as wind and solar, will help the environment.

Greg Aliff, Deloitte vice-chairman and US Energy & Resources leader, said consumers "show a desire for more-efficient energy and a willingness to pay some amount for it. The real question is just how much these technology advances will actually cost, and how much consumers are going to willingly accept." ✦

Murkowski asks Senate to swiftly ratify Law of the Sea treaty

Nick Snow
Washington Editor

The US could forfeit several billion barrels of oil equivalent if the Senate doesn't ratify the Law of the Sea treaty soon, warned Sen. Lisa Murkowski (R-Alas.) in a May 8 floor speech.

Noting that she has spoken frequently about the 10-16 billion bbl potential beneath the Arctic National Wildlife Refuge's coastal plain, Murkowski said "an unquantifiable amount of resource may lie—even further to the north, beyond ANWR, off the coast of Alaska and beyond."

She said the US Geological Survey estimates that the Arctic Ocean may cover 25% of the world's undiscovered oil and gas resources. That number, based on a 2000 assessment of a few Arctic basins, could prove conservative when the US Department of the Interior

WATCHING THE WORLD

Eric Watkins, Senior Correspondent

Shell blasted over Iraq oil

Political activists say Royal Dutch Shell threatens to trigger greater conflict in Iraq with plans to control the development, production, and depletion of the country's oil.

The warning from a coalition called Hands Off Iraqi Oil came as Shell held its annual meeting amid alleged "resistance" to the company's "bid to assume control over oil reserves."

Protestors from the coalition, including War on Want, Platform, Voices UK, and Iraq Occupation Focus, planned to demonstrate outside the annual meeting in London and question the board of directors inside.

In the view of the protestors, Shell wants "a controlling stake in the Kirkuk oil field, Iraq's oldest and second largest producing field, and the site of deteriorating ethnic violence, as well as the Maysan field in the south of Iraq, and the Akkas gas field in Iraq's Anbar province."

Campaigners warn that "Iraq would lose billions of pounds in oil income under a proposed new law which the British and US governments are pressing the Baghdad administration to sign."

Foreign domination?

Iraqi trade unions say the law will allow oil companies, such as Shell and BP, to secure power over new oil fields for 25 years, with the country's economy run by overseas firms.

Platform Codirector Greg Muttitt said: "Shell's rush to grab hold of Iraq's resources, whilst the country is still occupied, is likely to bring greater bloodshed to Iraq. The lives and livelihoods of ordinary Iraqis are being further threatened because of corporate greed."

There seem to be some non-sequiturs here. Worse, such statements fly in the face of facts because the Iraqi government itself recognizes that international oil companies (IOCs) represent the best way for the country to develop its hydrocarbons.

"The state simply cannot do this thing right," said Iraqi Deputy Prime Minister Barham Salih. "We can regulate it, but we need private investment to develop Iraq's production capacities," Salih told a group of delegates last week at the World Economic Forum in Sharm el-Sheikh.

Reputable IOCs

At the time, Salih told The Times of London that new exploration showed his country has the world's largest oil reserves, with as much as 350 billion bbl.

The figure is triple the country's present proved reserves and exceeds that of Saudi Arabia's estimated 264 billion bbl of oil.

Salih said the new estimate had been based on recent geological surveys and seismic data compiled by "reputable, international oil companies...This is a serious figure from credible sources."

He is frustrated that Iraq still struggles over the establishment of a regulatory framework. "There is a real debate in the government and among political leaders about the type of oil management structures we should have," Salih said. "I am for liberalizing this sector and allowing the private sector to come in to develop these vast resources."

Tell that to the protestors who oppose Shell's efforts to develop Iraq's oil. ✦

completes a more detailed survey that's currently under way, she said.

"What is the problem with this situation? The fact is, we believe the potential in the Arctic under the ice may be enormous, but we have no legal claim as a nation to most of this oil or gas unless the United States becomes a party to the Law of the Sea convention," Murkowski said.

"I can tell you, if we're not willing to claim it, if we don't step up to claim it, others will," she declared.

The treaty allows a coastal state to exert sovereign rights to all resources, living and nonliving, within its exclusive economic zones out to 200 nautical miles, or essentially its outer continental shelf, she explained. But it also allows a nation to lay claim to an extended OCS if it can show that the OCS extends beyond the 200-mile limit, Murkowski said.

Potential overlap

In 2007, she continued, the US Coast Guard cutter Healy went north beyond Alaska and into the Arctic Ocean to map the ocean floor and determine how far the continental shelf extends. The mapping that it brought back demonstrates that Alaska and the US can potentially add another 100 miles offshore to the existing 200-mile exclusive economic zone. The area, about the size of California, extends from the Canadian border through the Chukchi Sea, where it would overlap a claim that Russia already has submitted, she said.

"It is estimated that Russia's claim as its Arctic Ocean shelf—could hold 580 billion bbl of oil equivalent. And 90 billion of those bbl could be in the Chukchi Sea and the East Siberian Sea, close in to the state of Alaska," Murkowski said. Russia's claim covers 45% of the Arctic Ocean, she pointed out.

Australia, Ireland, New Zealand, Brazil, Norway, France, and Mexico also have submitted individual claims, and France, Ireland, Spain, and the UK have filed a joint claim, according to Murkowski. The United Nations Commission on the Limits of the Continental Shelf has already confirmed Australia's claim to another 2.5 million sq km of its extended OCS, she said.

"This is an area five times the size of France. For those of us thinking a little closer to home, that is three times the size of Texas. I believe it is only a matter of time before other claims are accepted as well," she said.

Several politically conservative groups have objected to US participation in the Law of the Sea convention because they believe it raises sovereignty questions. Other organizations support ratification, including the American Petroleum Institute, National Ocean Industries Association, and the International Association of Drilling Contractors.

The Senate Foreign Relations Committee favorably referred ratification out on Oct. 31 by 17 to 4 votes, Murkowski said. "We have the opportunity to stake a claim to an area of the seabed that we very strongly believe likely contains billions of bbl of oil. We have the research to demonstrate that the seabed is part of our extended continental shelf. But we cannot claim ownership of these resources without being a party to the Convention on the Law of the Sea," she said. ✦

Verenex eyes commerciality in Libya's Ghadames basin

Verenex Energy Inc., Calgary, contemplates the southern part of 1.5 million acre Area 47 in Libya's Ghadames basin as the core for an initial production phase of up to 50,000 b/d of oil by early 2010.

Two engineering firms are performing front-end engineering and design work on gathering, pipeline, and processing facilities. The company plans to incorporate the information into a commerciality application planned for early in the third quarter of 2008.

Because there has been no commerciality declaration, no reserves have been booked for Libya.

Since the company's initial discovery on the block in 2006 in Silurian Lower Acacus, it tested five other discoveries in 2007 and is preparing to test an apparent discovery at the A1-47/04 wildcat drilled in early 2008.

Besides Lower Acacus, various of the wells have tested oil from the Middle Acacus, Ordovician Memouniat, and Devonian Aouinet Ouenine formations.

Two of the 2007 discoveries tested at aggregate flow rates above 23,000 b/d of oil. Six exploration wells and one appraisal well have tested at a combined rate of 83,000 b/d. The E1-47/02 discovery has not yet been classed as commercial.

Meanwhile, the company was preparing to test the A1-47/04 wildcat, its first well in the northern part of Area 47, in mid-May. This is Verenex's third well to evaluate the Memouniat and based on logs the most encouraging to date. Two other prospects are prepared for drilling in the north.

Two rigs are working that will enable the spudding of 11-12 wells in 2008, four of which were spud by Apr. 30.

"The company is targeting to complete the full interpretation of results from the 2007 3D seismic program by the middle of 2008 and the 2008 2D program by the third quarter of 2008," Verenex said.

Verenex Libya is operator of Area 47 with a 50% interest, and Medco International Ventures Ltd. holds the remaining 50%.

The 2008 work program and budget, approved in October 2007, is up to $158 million for the acquisition of 2,400 line-km of 2D seismic, drilling and testing 11-12 exploration and appraisal wells, additional casing and tubing inventory, and expenditures for front-end engineering and design for the early production system

Verenex is targeting to drill some 50 exploration and appraisal wells during the 5-year exploration phase of the EPSA contract. At the point at which commerciality is declared, a joint operating company would be established to build and operate the development scheme in which the Libyan National Oil Corp. would have a 50% working interest. ✦

VERENEX LIBYAN GHADAMES BASIN WELL HISTORY

Table 1

Well name	Type	Total depth, ft	Tested oil rate, gross bo/d*	Perforated interval, ft	Status
A1-47/02	NFW	11,550	12,500	174	Discovery
B1-47/02	NFW	1,030	23,800	312	Discovery
C1-47/02	NFW	9,900	23,570	188	Discovery
D1-47/02	NFW	9,720	7,742	157	Discovery
E1-47/02	NFW	9,639	1,216	11	Discovery
F1-47/02	NFW	10,300	7,215	18	Discovery
A2-47/02	Appraisal	10,400	7,352	48	Interested water oil contact
D2-47/02	Appraisal	9,850	Trace	6	At water oil contact
A3-47/02	Appraisal	10,500	Trace	22	At water oil contact
A1-47/04	NFW	10,400	—	—	Preparing to test
A4-47/02	Appraisal	—	—	—	Drilling
B1-47/04	NFW	—	—	—	Drilling

*Test rates are not necessarily indicative of ultimate production rates.

Source: Verenex Energy Inc.

Ardmore basin Woodford gas plan takes off

Operators are pursing gas and liquid hydrocarbons in Mississippian-Devonian Woodford shale in the northwestern Ardmore basin in southern Oklahoma.

Bankers Petroleum Ltd., which calls the field Tishomingo, is implementing a development plan that entails drilling 30 gross wells in 2008 at a capital cost of $45 million.

The wells produce gas, oil, and natural gas liquids from the Woodford, which averages twice the formation's thickness in the Arkoma basin (see table).

Bankers had five wells on production in Tishomingo in mid-May at a combined 3.1 MMcfd of gas equivalent, 64% gas, and was recovering frac fluid from a second commercial discovery in the area.

Bankers is running five rigs drilling wells with horizontal legs on 640-acre spacing. Most of the drilling so far is in the southwestern Johnston and eastern Carter counties, just north of the Marshall County line.

Other operators in the area include Wagner & Brown, Chesapeake Energy Corp., Range Resources Corp., and Walter Oil & Gas Corp.

Drilling costs are lower than for Arkoma basin wells due to much easier drilling through formations that overlie the Woodford, Bankers said.

Bankers' leasehold in Carter, Murray, and Johnston counties is about half of the 24,000 net acres it acquired in May 2006 from Vintage Petroleum LLC in the Ardmore and Arkoma basins.

The Ardmore basin Woodford drillsites are 50 miles southwest of Woodford gas production in the southwestern Arkoma basin (see map, OGJ, Apr. 7, 2008, p. 40). ✦

ARDMORE-ARKOMA WOODFORD COMPARISON

	Ardmore	Arkoma
Depth range, ft	6,000-11,000	6,000-12,000
Gross thickness, ft	320-380 (345 avg.)	120-220 (150 avg.)
Avg. %Ro	[1]0.9-1.01	1.1-3
Total organic carbon, %	6.04-6.54	3-10
Silica content, %	52.5-66.5	60-80
Gas in place, bcf/sq mile	80-300	40-120
Drilling costs, million $	3.5	[2]7
Per well recoveries, bcfe	[3]3-5	[2]3-4.5
Gas content, btu/Mcf	~1,300	[4]1,050

[1]Suppression corrected. [2]Newfield 4.5 bcfe from laterals greater than 3,000 ft, Feb. 4, 2008, press release. [3]Low case MHA reserves report undeveloped case, high probability case on 10 proved undeveloped locations. [4]Newfield March 2008 Raymond James presentation.

Source: Bankers Petroleum Ltd.

Cuba

PetroVietnam Exploration Production Corp. let a contract to SCAN Geophysical ASA, Oslo, to shoot 4,000 line-km of 2D seismic in the Gulf of Mexico off Cuba.

The M/V SCAN Stigandi seismic vessel is to carry out the work in May and June on PetroVietnam's Blocks N31, N32, N42, and N43 west of the island (see map, OGJ, Dec. 11, 2000, p. 42).

Kazakhstan

The KUL01 well on the 2.14 million acre Kul-Bas exploration block in Kazakhstan's Ust-Yurt basin is a gas discovery north of the tie-in point of Kyzyloi gas field, said Tethys Petroleum Ltd., Guernsey, Channel Islands, UK.

Drilled to 1,945 ft, the well topped the Kyzyloi sand at 1,175 ft, about 328 ft shallower than in Kyzyloi field. The sand is more unconsolidated, potentially requiring screens for production.

A 10-ft perforated interval with 35% porosity was tested on various chokes and flowed at a rate of 2 MMcfd on a $^{40}/_{64}$-in. choke. Absolute open flow potential is 3.2 MMcfd.

Tasaran sand, topped at 1,470 ft, had elevated gas levels during drilling, and wireline logs showed some gas saturation, but gas did not flow on test. The company continues to map Tasaran units in the area.

Nigeria

Frontier Oil Ltd. has spud the first of two planned appraisal-development wells on OML 13 at Uquo, a 1958 Shell oil and gas discovery in the eastern Niger Delta off Nigeria.

Uquo-5, projected to 8,500 ft, is to be followed by Uquo-6. The company hopes to start oil production in 2009 through ExxonMobil Corp.'s Qua Iboe terminal 8 km south.

The discovery well tested both oil and gas in more than nine reservoirs. Uquo-2 through 4 discovered three separate hydrocarbon structures, within which a total of 15 accumulations exist. Ten are gas-bearing, two are proven oil-bearing, and three are probably oil-bearing.

Frontier Oil, operator with 60% interest, and Gulf of Guinea Energy Ltd. of Nigeria with 40% have shot 233 sq km of 3D seismic in 2006-07 covering the entire license.

Mart Resources Inc., Calgary, and Network Exploration & Production Co. Nigeria Ltd. plans to begin drilling by the end of June in Qua Iboe field in the eastern Niger Delta.

Mart said the companies resolved a dispute and discontinued arbitration proceedings.

Qua Iboe is a multireservoir oil field discovered by Shell in 1960 and never produced. It was awarded to Network in the April 2004 marginal field allocation program.

Mart will provide capital to develop the two main oil reservoirs in return for a share of hydrocarbons produced from those zones. Mart and Network will jointly fund development of the other reservoirs and share the value of the hydrocarbons.

Tanzania

The government granted exclusive

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The second Oil Sands and Heavy Oil Technologies Conference & Exhibition is scheduled for July 15 – 17, 2008, at the Calgary TELUS Convention Centre in Alberta, Canada. Once again this conference will highlight new technology in the growing oil sands and heavy oil industry.

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rights to Beach Petroleum Ltd., Adelaide, to negotiate to explore onshore and the southern half of Lake Tanganyika in western Tanzania.

The South Block covers 5,400 sq km and forms part of the 6,400-km-long East African Rift system as does Lake Albert. Oil seeps and surface slicks are well known on Lake Tanganyika, indicating a working petroleum system.

The company plans to negotiate the terms of a production-sharing agreement.

Quebec

Talisman Energy Canada has elected to drill the three remaining option wells under a farmout agreement from Questerre Energy Corp., Calgary, in Quebec's St. Lawrence Lowlands.

Talisman, by completing the work program, will earn 75% interest in the original 719,000-acre block. Questerre retains a 4¼% gross overriding royalty on production from Talisman.

Questerre noted that the land lies in the heart of the lowlands between the Yamaska growth fault and Logan's Line and runs from Quebec City to south of Lac Saint Pierre.

Drilling to start in the latter half of 2008 is to test multiple horizons including Trenton-Black River and the Utica and Lorraine shales.

California

Oil production from West Montalvo field in Ventura County began increasing in the quarter ended Mar. 30 due to remedial work and a 2007 extended reach offshore delineation well that went on line at more than 400 b/d, said Venoco Inc., Denver (OGJ, Sept. 3, 2007, p. 34).

The company expects the field's production to rise through the year from the next development stages. It has identified a second offshore location and probably will shoot 3D seismic before drilling that well or onshore infill wells.

Meanwhile, the state lands commission plans to release the South Ellwood field draft environmental report this month. The approval process could be complete in 2009, and Venoco has begun buying right-of-way for a 10-mile pipeline to replace a barge operation.

New drilling would accelerate draining the eastern part of the field and eventually provide more than $100 million in revenue to Santa Barbara County.

New Mexico

The Rio Arriba County, NM, Board of County Commissioners adopted an ordinance in late April purporting to impose a 120-day moratorium on all oil and gas drilling on private lands within the county in the eastern San Juan basin.

Approach Resources Inc., private Fort Worth operator, received notice that after the moratorium expires, the county plans to require it to apply for a local zoning permit in a process that could take an additional 120 days.

The moratorium covers Approach Resources' 90,300-acre El Vado East prospect in Rio Arriba County, and the company may not be able to drill eight wells before the primary term of the lease expires on Apr. 2, 2009. The company notified the lessor of the expected delay (OGJ, Sept. 3, 2007, p. 34).

Enhanced Oil Resources Inc., Houston, looks forward to starting carbon dioxide injection in Milnesand oil field in Roosevelt County, NM, in mid-June.

The reservoir has approached the pressures needed for a successful pilot CO_2 flood, the company said. Water injection in the pilot area averages 500 b/d, and waterflooding on the pilot area perimeter is expected to continue for the foreseeable future at 600-1,000 b/d. Three of the four pilot producing wells have been reworked and reperforated and are averaging 10 b/d of oil. The fourth well is being reactivated.

New York

A group led by Unbridled Energy Corp., Calgary, is drilling the third of six planned wells in Ellery and Villenova towns, Chautauqua County, NY, to the Silurian Medina formation and is applying a new frac technique to promote longer propped length.

The first well, Reheiser-2, was flow tested after treatment at rates of 325-450 Mscfd and turned to sales.

Mittlefehdlt-1, due for a frac job May 23, is a project with Schlumberger Data & Consulting Services sponsored by the New York State Energy Research & Development Authority to acquire new microseismic data to image the created hydraulic fracture.

The project will collect new reservoir and fracture information in the Grimsby, Whirlpool, and Devonian shales in Chautauqua County to optimize treatments.

Bankers Petroleum Ltd., Calgary, said it has acquired 100% working interest in 19,000 gross acres in the Appalachian basin in upstate New York.

The company plans to spend $500,000 to shoot 2D seismic in search of hydrothermal dolomite targets on the acreage and if it drills will evaluate Ordovician Utica shale at interim depths.

Ohio

Equitable Production Co. plans an eight-stage frac on May 16 at the Rapier D1-16 well in Jackson County, south-central Ohio, in the Devonian Lower Huron shale.

The well was drilled to 1,900 ft true vertical depth and then 2,500 ft horizontally in 4 days. By drilling, fracturing, and flow-testing three wells, Equitable will earn a 50% working interest in 25,000 acres held by Unbridled Energy Corp., Calgary.

A second well, S&D D3-30, has been drilled and is due for a seven-stage frac in early June. Both wells had gas shows, and a third well is being drilled.

The two companies continued to jointly lease lands in an 11-township area.

Operators, service providers grapple with deepwater well interventions

Nina M. Rach
Drilling Editor

Today's deepwater well interventions usually require big drilling rigs to place and pull heavy risers, but engineers visualize vessel-based, rigless interventions in future.

Demand for oil and natural gas is driving operators to search for new resources at greater depths. It's no longer unusual to spend as much as $100-150 million to drill a well in 5,000-10,000 ft of water to reach reservoirs at 25,000-30,000 ft TVD.

As these deepwater wells age and components wear, there will be an increasing need for deepwater intervention services and an increasing demand for cost-effective, rigless alternatives.

Chevron, BP, and three technology providers discussed deepwater interventions at a deepwater and emerging technologies group meeting in Houston in late April, sponsored by the American Association of Drilling Engineers—Houston.

Today

Current interventions require large floaters to set marine riser and kill a well and can cost $30-90 million. Most of that is in vessel day rates, and only about 5% is allocated for equipment, said Gary Ring, Blade Energy Partners.

The current average reliable operating life of artificial lift systems has been accepted by operating companies as follows:

- Gas lift valves (high opening pressure); 7 years.
- Large seafloor pumps (twin-screw, helicoaxial, single phase); 4-5 years.
- High-speed downhole turbine pumps (electric, hydraulic submersibles); 2-2.5 years.
- Downhole twin-screw pump; little data are available, but this pump has the same motor as the ESP.

There can be a great deal of downtime and lost production during deepwater interventions, Ring pointed out, and vessel availability can be limited on short notice.

Replacing a downhole pump can require 35-40 days, plus 2-17 days' lead time. Replacing a modular seafloor pump can take 6-14 days, with 2-6 days' lead time. Replacing a riser pump can take 2-5 days.

Given the time requirements and current day rates, Ring said there's a greater emphasis on seafloor lift systems than downhole systems. If the anticipated intervention costs less, installing artificial lift on more wells will make sense, fiscally.

Ring suggested several low-cost approaches:

- Use a deep-set master valve, which allows deeper pump placement without the need to set a riser and kill the well.
- Use coiled-tubing reentry through a subsea intervention lubricator system (SILS).
- Install a pressure canister at the wellhead.

Artificial lift

Reservoir pressure depletion is one of several potential problems that would require intervention. The DeepStar joint industry project to develop deepwater technologies, addressed artificial lift (OGJ, May 5, 2003, p. 66; www.deepstar.org).

"Only 5-10% of the available resource [in deepwater wells] can be produced without reservoir pressure maintenance or artificial lift. We can increase the percentage by increasing the reservoir pressure or by lowering the hydrostatic pressure in the well."
–Gary Ring, Blade Energy Partners

Ring said "Only 5-10% of the available resource [in deepwater wells] can be produced without reservoir pressure maintenance or artificial lift. We can increase the percentage by increasing the reservoir pressure or by lowering the hydrostatic pressure in the well."

Reservoir pressure can be increased with gas or water injection, but this requires large volumes of fluids and corresponding large pumps and high pump rates. Injection also requires dedicated injection wells, which are expensive and time-consuming to drill in deep water.

Gas lift, in either the riser or downhole, will lower the hydrostatic pressure, but the benefit derived depends on the crude composition, including the API gravity, bubble point, and GOR watercut. A steady supply of gas is required. After a point, frictional loss in the tubing overcomes any advantage. Also, long horizontal flow lines can lead to slugging if there's an inversion between the riser and the wellhead, Ring said.

Pumping is easiest and cheapest in the riser, followed by seafloor pumps, but downhole pumps provide the greatest benefit (most reservoir drawdown). Seafloor pumps include twin screw, helicoaxial, single phase pumps, electric submersible pumps (ESPs), and hydraulic submersible pupms (HSPs). Downhole pumps are limited to ESPs, HSPs, and a single manufacturer for twin-screw pumps, according to Ring.

2007 milestones

"Operators last year planned for future deepwater interventions and set records with some 2007 equipment installations," Ring said.

In the deepwater Gulf of Mexico (8,000 ft) and Brazil (6,250 ft), Shell installed:

- Subsea gas separation equipment.
- Centralift ESPs.

At its Gulf of Mexico King field (5,500 ft), BP installed dual Bornemann twin-screw, multiphase pumps operating in parallel, 18 miles from the Marlin platform (OGJ, Oct. 8, 2007, p. 49).

A Hydramarine crane on the MV Maersk Achiever lifts one of FMC's subsea trees from a transport barge for Chevron's Blind Faith project in the Gulf of Mexico (Fig. 1; photo from Chevron Corp.).

Wet vs. dry trees

Rob Perry, deepwater and subsea technical director at BP America Inc., discussed the historical gap between subsea ("wet") and dry tree fields. The installed base of subsea trees is increasing and the technology is maturing, he said, although wet trees have typically been used in fields with lower reservoir complexity.

Examining intervention frequency and type, Perry noted that wireline is used most frequently for intervention, followed by coiled tubing, and lastly, rigs. Most interventions are carried out on dry trees, but the disparity between wet and dry decreases when coiled tubing and rigs are used.

"A small step doesn't get us far–either for operators or suppliers. It has to be a big jump to change the game."
–Rob Perry, deepwater and subsea technical director, BP PLC

DW hurdles

Chevron Corp.'s Ricky Cummings said several questions face the industry:

- Gauging the differential pressure limits of BOP equipment.
- Critical timeline to develop 15,000-psi subsea well intervention equipment.
- Efficacy of using multiservice vessels (MSVs) in place of mobile offshore drilling units (MODUs).

BOP reliability

Several operators (BP PLC, Chevron, Devon Energy Corp.), contractors, and the US Minerals Management Service participate in a joint industry project on BOP reliability, chaired by Chevron's Frank Gallander. The JIP's mission is to add overall efficiency to operations while maintaining high standards, reliability, safety and environmental stewardship.

Internally, Chevron has identified critical components and single points of failure to assist in the selection of capable drilling rigs.

Deepwater BOPs can be subject to negative differential pressures, and this is most often seen in completion and intervention work, Cummings said. Among the components affected by negative differential pressures are ram bonnets, ring gaskets (in BOPs and elsewhere), subsea flexible hoses, and choke and kill valves.

High-pressure equipment

Most "high-pressure" systems are tested to 10,000 psi, but an increasing number of deepwater projects require equipment capable of 15,000 psi. Operators drive the development of equipment and speakers noted they will have to share the risk in order to sustain

the pace of research.

Chevron faced the need for higher pressure subsea well intervention equipment in the Gulf of Mexico, where the company has six deepwater wells at its Tahiti project (4,100 ft WD; Green Canyon Blocks 596, 597, 640, 641), and four at Blind Faith (7,000 ft WD; Mississippi Canyon Blocks 695, 696), and the Jack-2 well (7,000 ft WD; Walker Ridge Block 758).

Chevron expects to begin production at Blind Faith in 2008 (OGJ, Dec. 17, 2007, p. 33). Originally scheduled for 2008 production, completion of the Tahiti facilities was delayed because of a metallurgical problem with the mooring shackles (OGJ, July 23, 2007, p. 9). The company has installed subsea production trees and will run the BOP down with the riser to save trips.

Cummings pointed out the limitations of using coiled tubing, which reaches its fatigue limit after only six runs at full working pressure of 15,000 psi at these water depths. Chevron is still developing a compensated CT lift system that can be used on MODUs, he said.

In a 2003 systems integration test in New Iberia, La., Halliburton checked a 4 1/16-in. diameter, 15,000 psi BOP and a 135,000-lb coiled tubing injector head lift frame (Fig. 2; photo from Chevron).

MODU vs. MSV?

Mobile offshore drilling units offer more deck space than multiservice vessels, but MSVs often cost less, can handle multiple ROVs, and can provide offline rig operations. Many are foreign flag vessels, however, and thus forbidden under US cabotage laws (Jones Act, 1920) from transporting materials in US waters. This complicates subsea tree handling, Cummings said. The trees must be carried from port on a barge and transferred to a foreign-flag MSV on site (Fig. 1).

Chevron has two new dynamically positioned vessels with active-heave drawworks that will "play an important role" in the company's Gulf of Mexico projects, said Cummings, as well as a new inline direct-line compensator for DP rigs.

Systems integration testing is expensive, but critical, Cummings said (Fig. 2). "Know your systems, know what they're capable of, and carefully examine the worst case scenario for differential pressure—a completely evacuated system."

Shell UK Ltd. has employed the DP-enabled MSV Seawell since May 2000 for light well interventions in the North Sea. Shell renewed its commitment for a minimum utilization of 185 days/year from 2007-10 with Well Ops UK Ltd., a wholly owned subsidiary of Helix Energy Solutions Group Inc., and has options for an additional 60 days/year.

The MSV Seawell has operated in the North Sea exclusively since 1987, during which time it has performed well intervention services on more than 600 subsea wells and decommissioned more than 150 wells.

Future LWI

Helix is building a second LWI vessel, the WOUK Well Enhancer, that will be coiled tubing-capable and carry an intervention riser tested to 10,000 psi. CT intervention is only done through rigid risers. "More and more we'll see that coiled tubing will be an important tool for interventions," said Helix's Kurt Hurzeler.

There's only one 15,000-psi intervention riser in the world, used by BP on its deepwater Thunderhorse project (6,300 ft) in the Gulf of Mexico.

BP's Perry sees vessel-based, rigless intervention in the future. The number of deepwater wells is growing with time and will eventually reach a critical mass. This install base and high oil prices will eventually result in the building of dedicated intervention vessels.

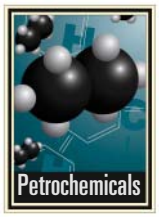
Perry said industry should create a list of wells that are candidates for subsea intervention, consider well intervention vessels, and avoid scope and cost creep.

"A small step doesn't get us far—either for operators or suppliers. It has to be a big jump to change the game."

A new light well intervention ship, Island Constructor, is currently under construction and will have FMC's subsea lubricator system (SIL). The ship may be outfitted for CT intervention in the future, but this will require adding a marine riser. The Island Constructor is owned by Marine Accurate Well ASA (MARACC) operated by Island Offshore Management AS. BP has the ship under contract from mid-2008 with several options to extend. ✦

Regional factors define future polymer trading

Paul Bjacek
Accenture
Houston



A recent Accenture study found that all regions around the world are growing in polymer consumption, although their focuses are different.

Developed nations are focusing on adding value to existing products, creating new value-added products, and continuing to lead in developing new services. Developing economies are spending on the basics—exporting is their value-added activity.

Global investment is growing fastest in regions with higher risk, although manufacturers may be overlooking important, untapped opportunities in developed nations.

Requirements to supply polymers vary by each region's market and product mix and, due to the wide variability possible in labor costs even within a particular country, future investment will be led more by subregions or "hot spots" rather than individual countries per se. Given that, future investment strategies will require an extremely refined understanding of each region's product mix, political environment, and potentially wide variances in business costs.

Accenture conducted the study to understand the effect of anticipated changes in manufacturing geographies. Key to the study was a scope that included trade of the polymers themselves and also of polymers "in situ," that is, contained in the end product (See box, "Our methodology in brief").

One of the study's objectives was to provide a balanced perspective on market sector trends within each region and what it will take to compete in emerging and developed regions.

Multipolar trends represent big opportunities or big problems for global producers as they strive for high performance (See box, "The multipolar world").

Those who understand the need for investment in future underserved markets stand to reap significant advantage. Those who take a black-and-white look, however, risk eroding performance and losing competitive advantage to those companies with the vision to look not only outward for opportunities, but to the overlooked ones locally as well.

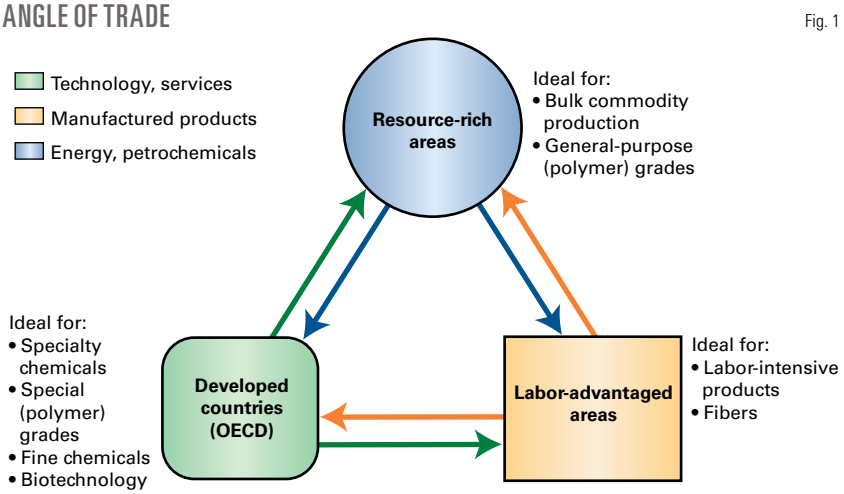
World investment

The "triangle of trade" (Fig. 1) shows the nature of global competition and forces for investment in polymer manufacturing. The basis of competition varies between regions:

- Technology and services in devel-

TRIANGLE OF TRADE

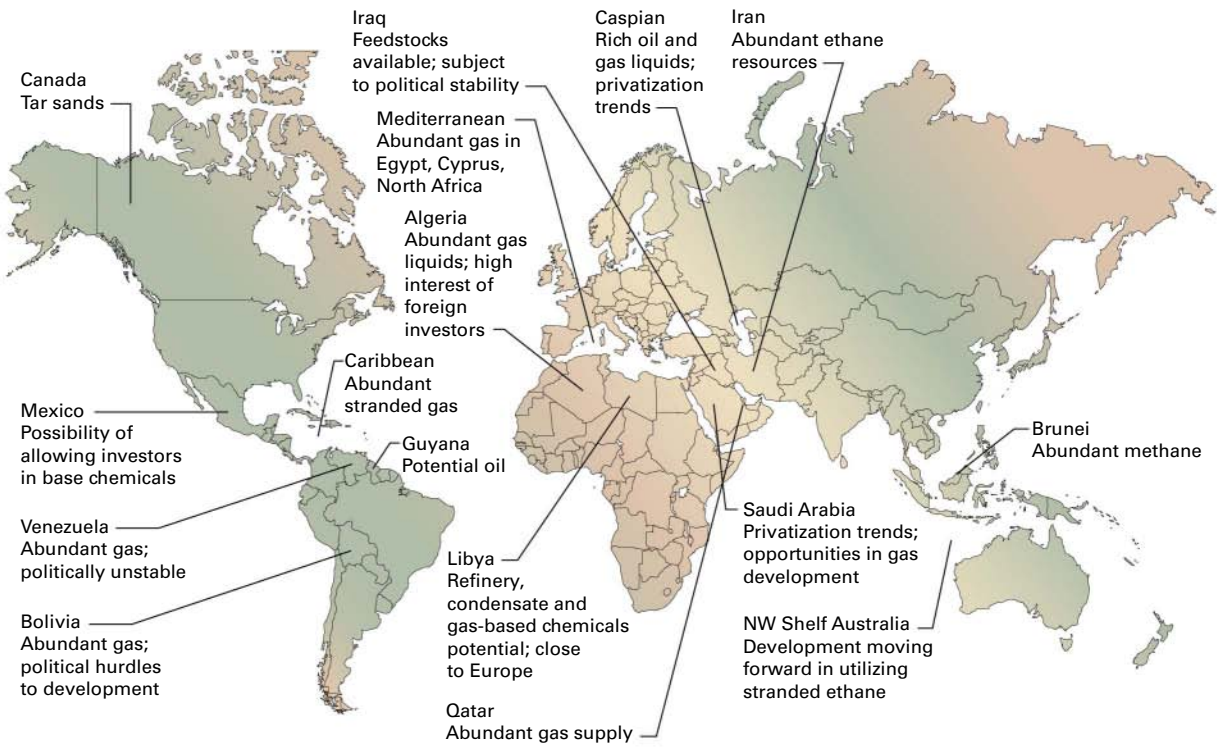
Fig. 1



Source: Accenture Research

Evolving feedstock regions

Fig. 2



Source: Accenture Research

oped countries (such as North America, Western Europe, and Japan).

- Manufactured products in labor-advantaged regions (such as India and China).
- Energy and petrochemicals in oil and gas-producing areas (such as the Middle East and areas of Africa).

Likewise, the forces of investment in manufacturing reflect the respective competitive advantages in each region. In oil and gas-producing regions, therefore, the manufacturing focus is on bulk commodity production and general-purpose (polymer) grades.

Labor-advantaged areas are ideal for manufacture of textiles and other labor-intensive products. Finally, developed (Organization for Economic Co-operation and Development, OECD) countries are leaders in development of new products and lead in manufacture of value-added grades of polymer, fine chemicals, and biotechnology. As these products become commoditized, they then move to labor-advantaged regions, sometimes bringing along demand for higher-value chemicals.

The availability of feedstocks (oil or gas products that become the raw materials for the manufacture of petrochemicals) and labor also lead to development (and feeding into investment considerations).

Most petrochemicals are petroleum or gas based and because energy accounts for about 85% of the cost of petrochemical manufacturing, the sources of energy influence investment; but supply patterns are not static. As new low-cost feedstock regions develop, so too will new petrochemical and polymer sources and trade routes.

Regions such as the Middle East are also industrializing, especially in energy-intensive businesses, as a way to convert hydrocarbon resources to jobs and harness the added value downstream of the wellhead.

Even in areas with abundant energy sources, however, other issues—particularly

Worldwide polymer consumption

Table 1

Market sector	Consumption, 1,000 tonnes 2006	2016	2006-16 growth, %/year
Food	42,025	71,774	5.5
Textiles	32,176	51,630	4.8
Furniture	13,687	22,993	5.3
Printing	780	1,220	4.6
Plastic products	43,500	78,361	6.1
Fabricated metals	1,519	2,259	4.0
Machinery	2,397	3,658	4.3
Electrical, electronic	13,810	25,499	6.3
Other transportation	9,330	16,181	5.7
Vehicles, parts	10,746	15,625	3.8
Other equipment	3,852	6,334	5.1
Other manufacturing	21,238	33,569	4.7
Construction	45,886	72,919	4.7
Total	**240,947**	**402,022**	**5.3**

Our methodology in brief

Accenture Research developed a method for forecasting demand for chemicals by linking industry-expert-derived forecast demand in downstream end-use markets, supplied by Global Insight (USA) Inc. To do this, we identified polymer consumption in each major end-use market and region.

This approach of examining demand for polymers produces a more reliable demand outlook because it takes into consideration not only chemicals but also end-market expertise.

For this study, we examined the demand for certain polymer segments[1] within many end-use markets[2] covering the consumption of all major plastics, fibers, and paints (which we call "polymers" in this study), across a comprehensive group of manufacturing countries and regions that encompass the entire world market.[3]

We examined finished goods and polymer trade flows and balanced the demand outlook with our own supply forecast, which is based on our understanding of polymer production economics, feedstock trends, and other geopolitical factors.

Based on this work, we observed that:

- World investment is growing fastest in regions with higher risk.
- All regions are growing in polymer consumption, although their focuses are different.
- Seeds of future polymer demand growth can be found in subregions or "hot spots" with a particular advantage.
- Raw material centers are evolving as new resources are found and political tides change.
- The future chemical industry will include more government ownership and, therefore, the competitive landscape will develop differently.
- Within each region there are "safe haven" markets that are least susceptible to international trade swings.
- Companies are finding alternative sources of talent in order to lower costs and achieve higher levels of innovation, such as through the establishment of research and development centers in emerging markets and outsourcing various functions.
- Future investment strategies will require an extremely refined understanding of each region's product mix, political environment, and potentially wide variances in business costs.

End notes

1. Thermoplastics, polyurethanes, fibers, and paints.
2. Food, textiles, furniture, printing, plastic products, fabricated metals, machinery, electrical and electronics, other transportation, vehicles and parts, other equipment, other manufacturing, and construction.
3. Includes Africa, Argentina, Australia and New Zealand, Brazil, Canada, China, India, Japan, Mexico, the Middle East, Russia, South Korea, Taiwan, Thailand, the US, Western Europe, and other countries in Central and South America, Central and Eastern Europe, and Asia-Pacific regions. Our selected industries do not cover all manufacturing, and our forecast is a baseline—that is, it does not take into account the effect of anticipated environmental legislation, trade legislation, substitution trends, technology trends, paint formulation methods, and oil or raw material price changes.

those related to political stability or heavy government involvement in the industries—prevent any one area from being the "ideal" region for investment. While Iraq has feedstock available, for example, the ongoing conflict certainly dampens investment prospects. Bolivia and Venezuela, likewise, have abundant gas resources, but significant political hurdles to overcome (Fig. 2).

Similarly, any examination of labor-rich countries as investment prospects must account for government policies that sometimes do not align with business needs. These issues include trade barriers and unfavorable regulations, to low-priority infrastructure development, to a lack of intellectual property protection and outright corruption. The ideal low-labor-cost region does not yet exist.

Polymer consumption

There is no absolute picture of smart investment in any particular region. The largest two market sectors will be the least susceptible to global trade changes in polymers.

The Middle East and China will remain the axis of trade. The Middle East will be the largest exporter having an expected net export of petrochemicals of 25 million tonnes by 2016 (mostly geared toward serving China); correspondingly, China will be the biggest importer of polymers with an expected net import of 16 million tonnes by 2016.

Growth in other regions of the world may more likely be overlooked. The polymer industry will continue to grow in the US and Western Europe, due to demand for higher-end polymer products related to food packaging, medical instruments, and more. These regions should continue to be a target

POLYMER NET TRADE IN 2016

Table 2

	Net trade, 1,000 tonnes
Canada	697
US	(4,231)
Mexico	(2,886)
Brazil	553
Argentina	(1,301)
Other South, Central America	(4,412)
Western Europe	(406)
Russia	1,439
Other Central, Eastern Europe	(2,375)
China	(15,588)
India	1,148
Japan	155
South Korea	5,278
Taiwan	3,679
Thailand	1,030
Australia, New Zealand	(1,302)
Other Asia-Pacific	(3,534)
Middle East	25,251
Africa	(3,125)

for global producers (Tables 1 and 2). By 2016, for example, demand for polymers in the US will result in a net import of about 4.2 million tonnes.

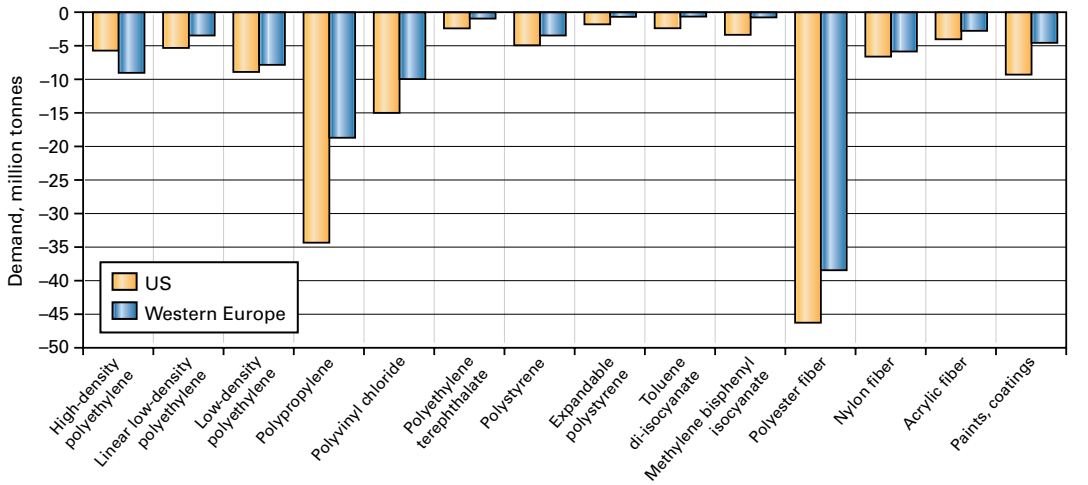
Essentially, the US and Western Europe will import polymers by 2016 that combined are the equivalent production of 10 world-scale polymer plants. All regions of the world will increase polymer consumption by 2016, with the US and Western Europe second and third, respectively, behind China. This forecast refutes the notion of investing strictly along the Middle East-China axis of polymer trade.

In addition, our research forecasts that "lost" polymer demand in the US and Western Europe, based on manufacturing net trade adjustments (the cumulative difference between projected sales and potential sales of polymers within the anticipated net trade of manufactured goods during 2006-16), equates to 150 million tonnes and 105 million tonnes, respectively.

Producing that volume of polymers would translate into the production capacity of about 40 US and 30 Western European world-scale polymer plants—plants that will be built in other regions due to the lack of competitiveness in downstream manufacturing in the US and Western Europe. Global producers should understand this gap and selectively allocate new investments based on each end-use market's requirements in developed and developing regions (Fig. 3).

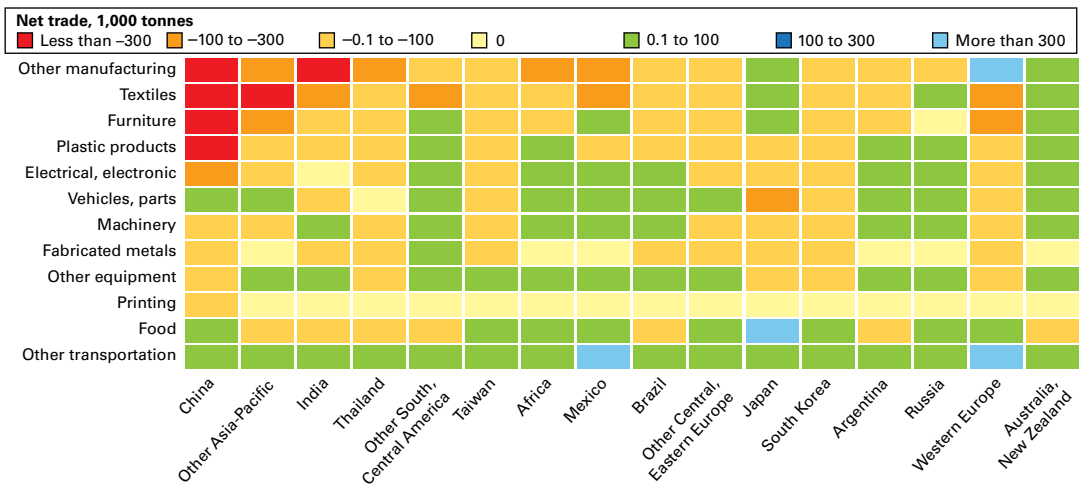
Lost polymer demand

Fig. 3



Polymer net trade 'heat' map, 2006

Fig. 4



Future investment strategies

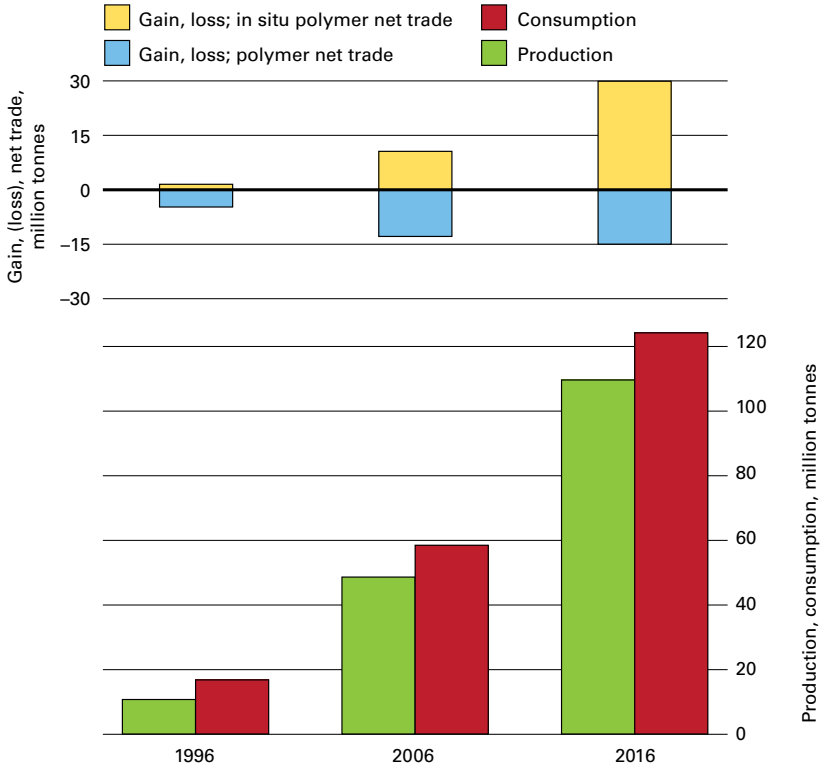
Polymer demand will continue to grow around the world. Our research shows, however, that investment strategies must be far more refined than focusing on particular countries. Requirements to meet polymer needs will vary by each region's market and product mix.

Developed regions will continue to be large manufacturing centers and will continue to be the most inventive and value added. Plastics manufacturers in these regions are innovating constantly and continually looking for ways to squeeze costs out of their supply chain. We see providing domestic capacity as a real opportunity within the US, for example.

Textiles and the commodity portions of furniture and other manufacturing are the most susceptible to competition, whereas cutting-edge offerings in construction (not internationally traded per se), transportation, and food packaging represent better opportunities (Fig. 4).

CHINA POLYMER BALANCE

Fig. 5



The multipolar world

Globalization, the formative idea of our age, continues to affect the economic geography in ways we are only beginning to understand. The rise of this new world—what Accenture calls the multipolar world—is constantly reshaping our perspective.

Increased economic interdependence across five key dimensions characterizes this multipolar world:

- *Capital.* The rapid growth of emerging economies as sources of outward foreign direct investment and destinations for portfolio investment.
- *Talent.* Favorable demographics spurring rapid growth of emerging-market workforces.
- *Resources.* Increasingly intense competition for energy, commodities, and raw materials.
- *New consumers.* Rapid income growth creating up to a billion new consumers in emerging markets.
- *Innovation.* The growth of new clusters of innovation and specialization in emerging economies.

The multipolar world is opening new opportunities not only to traditional companies, but also to local and resourceful operations that understand more closely the potential in their "own backyards."

The multipolar world is not a world of absolutes, where traditional first-world economies begin to give way before the rise of countries such as India and China. Rather, in the multipolar world, not only will the traditional and new powerhouses have significant roles, but other players will also: Mexico, Russia, South Korea, Brazil, and Eastern Europe, among others.

In China, as domestic capacity grows, the country will continue to experience a shortage of polymers. Its export of polymers in situ will rise dramatically during 2006-16 (Fig. 5).

Fig. 5 shows that textiles, commodity electrical and electronics, and basic machinery are strong in China. In 2007, China contributed just more than 15% of the world's manufacturing, but only slightly more than 5% of the world's gross domestic product, indicating its lack of value-added sectors, such as services.

Economic growth is skewed toward manufacturing investment for finished goods, which is causing increased inflation. This may result in competing, low-labor-cost nations such as India, Vietnam, Indonesia, and Latin America winning more investment.

One subregion or investment "hot spot" is along Thailand's Myanmar border, where textile investment is growing rapidly due to its abundant low-cost labor pool. Textile investment is a good indicator of future manufacturing investment by other labor intensive, polymer-consuming industries.

On the other end of the axis of trade, the Middle East and Africa will continue to be the largest exporter of polymers (primarily by the Middle East), and there will be a dramatic rise in their exports through 2016. Because most finished goods are imported to these regions, there will be a less dramatic but still notable trade deficit of in situ polymers during the next decade (Fig. 6).

Like China, the Middle East and Africa are far from a clear-cut investment case. Supply development challenges vary by country, as does the role of government in industry.

Some countries are under economic sanctions, such as Iran for example, and others may have foreign investment restrictions and other factors at play. Also, in most emerging markets, there are investment hindrances surrounding the areas of intellectual property protection, barriers to market entry and acquisitions, labor regulations, environmental

and safety issues, and other concerns.

The obstacle in all cases will be to balance revenue growth with operating margins (which lead to total return to shareholders). This is an important point. We frequently see companies investing in China for revenue growth. Their operating margins get diluted, however, because more of their assets will be competing in the low price, cost-competitive markets of those regions.

In contrast, the developed regions offer slow revenue growth, but higher operating margins. There is growth in these areas, and the demand for polymers will no longer be confined to the most basic forms.

Competitive manufacturers will continue to demand innovative products, and companies with a smart global investment strategy understand that, while producers must be able to serve in China, product innovation begins in the developed nations and migrates elsewhere. To meet downstream needs, therefore, producers also need to remain on the leading edge of innovation.

Some of this innovation can come from the abundant pools of scientists and engineers in India and China. Many companies have placed research and development assets in those areas to serve traditional and burgeoning markets.

Keys to adding value

How do these trends translate into smart investment strategy? For making the most out of investing in a multipolar world, we recommend:

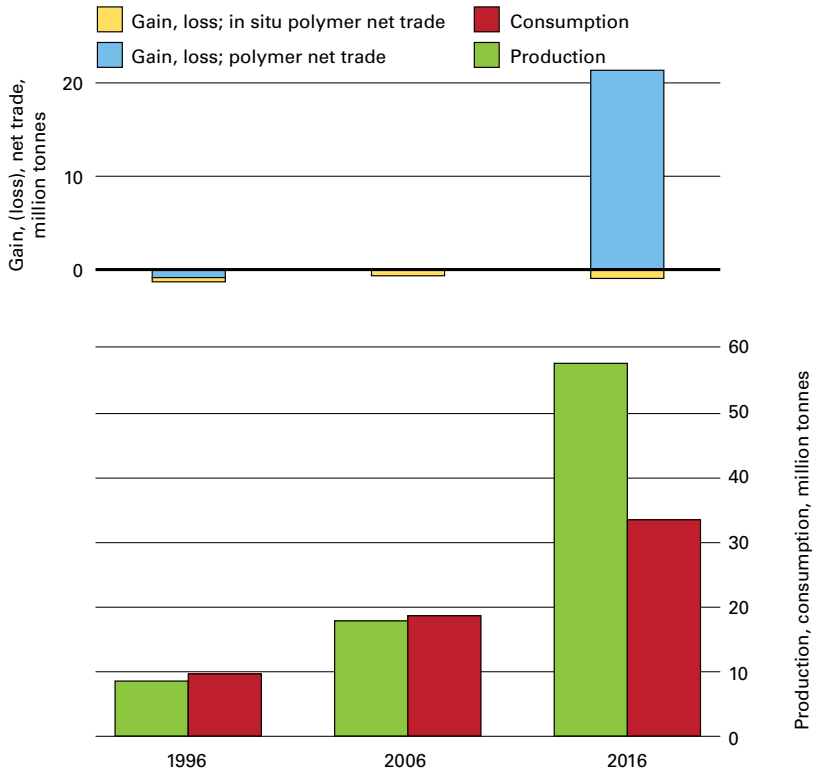
- Adding more value for current customers. The first key to adding value is to sell more to the same customer groups—materials, services, or systems. The paint industry, for example, no longer sells just paint to auto manufacturers; over time industry companies have taken over the role of the paint shop—providing expertise in applying the paint and recovering spent solvents or waste materials afterward.
- Using mergers and acquisitions (M&A) to enhance market position. Accenture research into high performance has shown that companies that are leaders in M&A increased margins relative to their peers. These companies have M&A instituted as a process, with people dedicated to the acquisition and timely integration to get new areas of business up and running quickly.

Also key is that top-tier businesses do not acquire simply to add volume. Rather, they acquire to add value—to enhance their services and products for their customers. Selective M&A can also be used to enhance positioning; a domestic paint manufacturer, for example, may acquire a company with a more global presence to serve in other areas.

- Managing scale and selectively using technology and assets to take advantage of multipolar trends. High-performance chemical manufacturers have a keen awareness of global forces and opportunities and have established M&A practices to support geographic or market positioning. Yet they also continue to develop their home markets, using them as a platform to develop new technologies, new markets, and business know-how, which can then be used in their global operations. ✦

MIDDLE EAST, AFRICA POLYMER BALANCE

Fig. 6



The author

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PIPIP technology aids LNG transfer

Michael Offredi
ITP InTerPipe SA
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Houston

The inherent design features of current pipe-in-pipe-in-pipe technology allow LNG to be transferred both subsea and buried onshore safely and securely, with minimal risk to the environment. This ability is enhanced by an associated integrity monitoring system that provides rapid and sensitive leak-detection capabilities. ITP InTerPipe's PIPIP technology received DNV's Certificate of Fitness for Service in 2007.

Leaks are primarily detected by monitoring pressure in the annulus. Because the inner annulus is closed, arbitrarily small leaks can be detected via pressure measurement; the only variable being how much time is required. The leak-detection capability in the PIPIP system is orders of magnitude better than can be achieved with conventional leak detection. For example, a leak of 0.002 cu m LNG/hr (0.00004% of the flow rate) can be detected in about 18 hr.

The case study presented shows the ability to detect leaks when about 40 l. of LNG had leaked into the annulus. Since the inner annulus pressure is less than the triple point of methane (117 millibara), pure methane cannot exist as a liquid in the annulus. Leaks will consist primarily of a mix of vapor and solid methane, with the solid methane subliming after continued contact with the inner pipe.

Leak location can be detected by fiber optic methods for all leaks large enough to affect the temperature of the intermediate pipe. Annulus pressure monitoring will detect a small leak more quickly than the fiber optic temperature monitoring. The fiber optic method will detect large leaks more quickly. A leak in the intermediate pipe can be distinguished from a leak in the inner or outer pipes by either the fiber optic measurement or the rates at which the pressures of the inner and outer annuli change.

Background

LNG projects involve large capital investments and all product must pass through a pipeline to and from the ships. This requires reliable pipelines, particularly if they are to be subsea and, ideally, accurate, reliable pipeline-integrity monitoring systems. This article discusses the inherent safety of an LNG PIPIP design as well as leak-detection thresholds and times.

Pipe design

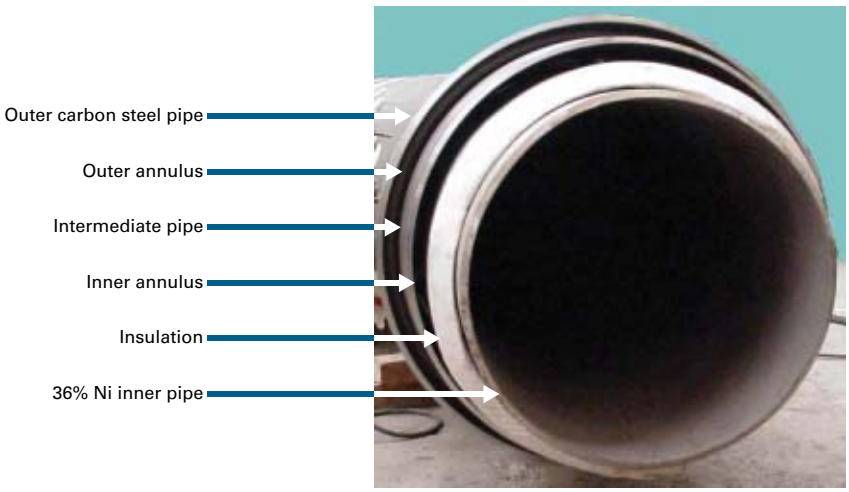
ITP undertook a formal technology review process for its LNG pipe technology, culminating in a DNV Certificate of Fitness for Service (OGJ, May 21, 2007, p. 62). Fig. 1 shows the multi-walled LNG pipe.

Its key features include:

- A 36% NiFe inner pipe with a coefficient of thermal expansion ten times lower than that of stainless steel. The low CTE minimizes expansion and contraction of the pipeline, mitigating the need for expansion loops or bellows. LNG carriers have used 36% NiFe for membranes for more than 40 years.
- Patented microporous insulation, used in subsea pipelines since 1998. The insulation consists primarily of silica and titanium dioxide. Installed in an LNG pipeline, it provides an overall U-value of 0.131 w/sq m-°C. using only 40 mm of insulation. The insulation also has high mechanical compressive strength and can support the weight of the filled LNG pipe, eliminat-

TRIPLE-WALL PIPE-IN-PIPE SECTION

Fig. 1



ing the need for centralizers. The insulation can tolerate temperatures up to 900° C., allowing the intermediate and outer pipes to be welded directly over the insulation without damaging it. Field joints can thus be insulated with the same procedures as running pipe.

• An inner annulus, typically continuous along the entire pipeline length. The inner annulus operates at reduced pressure. The reduced pressure increases the thermal performance of the insulation, eliminates inner annulus conditions which could allow methane to exist as a liquid (only solid and vapor can exist), and acts as a straightforward, robust, and sensitive leak-detection system.

• An intermediate pipe designed to handle collapse, providing additional protection from external damage and the environment. Depending on specific application, the intermediate pipe's design can provide double pressure containment to prevent release of the LNG into the environment.

• An outer annulus with the pressure continuously monitored.

• A carbon steel outer pipe designed for collapse and prevention of buckle propagation, and featuring anticorrosion coating and cathodic protection for a subsea pipeline.

The triple-wall pipe design provides two barriers of protection from accidental external damage in a subsea application. Onshore applications would typically use a double-walled design. Bulkheads connect the inner and intermediate pipes and the intermediate and outer pipes. These bulkheads form sealed inner and outer annuli. Field joints consist of straightforward butt welds for all pipes (inner, intermediate, and outer).

A pipeline integrity-monitoring system based on continuous pressure monitoring of both annuli detects leaks and differentiates between leaks in any of the three pipe walls, providing leak detection orders of magnitude more sensitive than conventional pipeline integrity monitoring systems. Including a fiber optic system in the outer annulus can provide secondary leak detection and location. The fiber optic also provides the temperature of the intermediate pipe along the entire length of the pipeline at 1-m intervals.

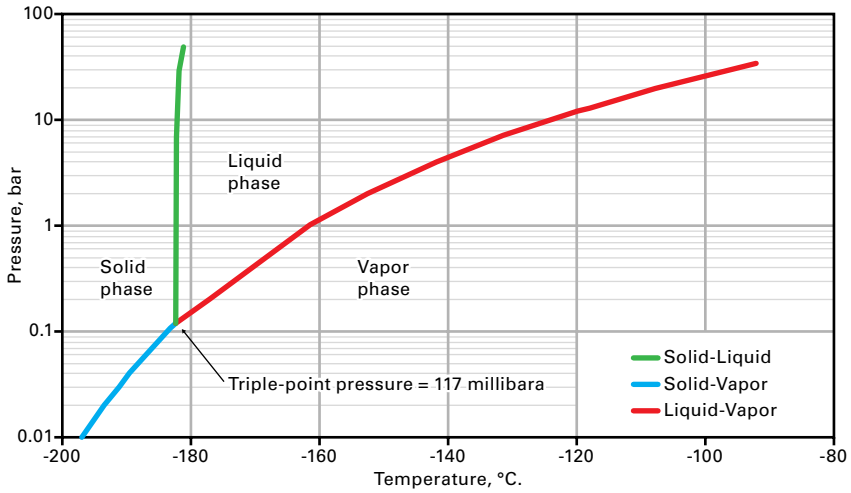
A pipeline integrity-monitoring system similar to the one described here recently quickly verified the integrity of Camisea LPG PIP pipelines in Peru after a magnitude 8 earthquake centered near the pipeline installation

Methane

The inner annulus of the PIPIP system is maintained at a reduced pressure (i.e., below atmospheric). Fig. 2 shows a phase diagram for pure methane. Maintaining pressures below the triple-point pressure of 117 millibara prevents formation of liquid methane. Instead, when the LNG flashes across the leak to the reduced-pressure environment in the inner annulus, the final phase will be either vapor, or a mix of vapor and solid methane. Thus, as long as the inner annulus pressure remains below 117 millibara, no liquid methane can exist.

The LNG's composition, however, affects this process. Since the triple-point pressures of ethane, propane, and butane occur at much lower pressures, a small portion of any leak may be liquid depending on the actual composition of the LNG.

PURE METHANE PHASE Fig. 2



Preventing liquid methane from entering the inner annulus limits the likelihood that it could accumulate at the bottom of the intermediate pipe. Such accumulation would result in highly localized cooling and, for PIP or PIPIP designs using a carbon-steel intermediate or outer pipe, a drop below the design temperature of the carbon steel pipe.

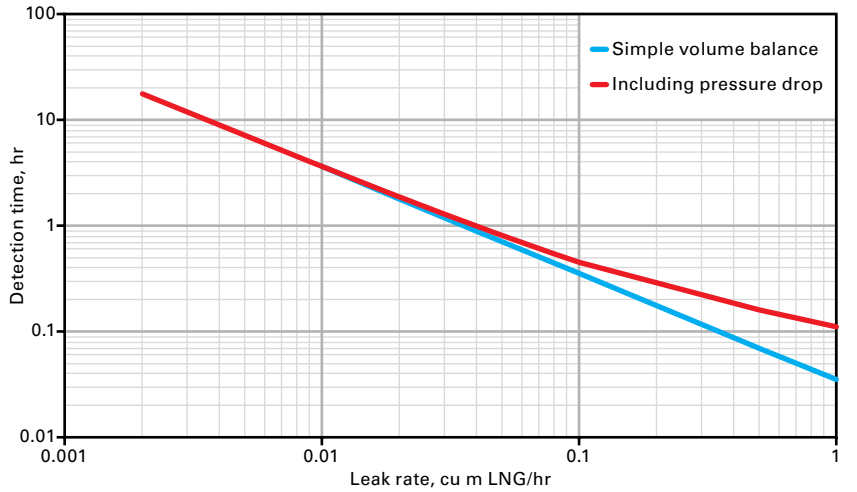
Since only gas and solid are present, however, the solid will remain local to the leak (it will eventually sublime into a gas phase) and the gas phase will diffuse into the annulus. If only gas is present, it will also cool the intermediate pipe, but being much more diffuse will do so in a less localized manner.

Integrity monitoring

The PIPIP design provides a rapid, sensitive, and accurate leak-detection system. Both annuli are continuous and the pressures in the annuli are continuously monitored. Since the annuli are closed and the pressures in the two annuli are different (<117 millibara in the inner annulus and about 3 bar in the outer annulus), any leak results in a pressure change in one or both annuli, allowing the leak's detection. A fiber optic in the outer annulus can also detect the location of any leak in the inner pipe that poses a risk to the intermediate pipe.

LEAK DETECTION TIMES, MIDDLE OF PIPELINE

Fig. 3



Case study

Main parameters governing design of the PIPIP were:

- Length, 10 km.
- Total flow rate, 10,000 cu m/hr.
- Number of pipelines, two.
- Maximum water depth, 15 m.
- Ambient temperature, 25° C.
- Burial depth, 1 m to top of pipe.

With these parameters, preliminary design of the PIPIP resulted in the following system:

- Inner pipe, 30-in. OD (36% nickel, designed for 30-bar internal pressure).
- Intermediate pipe, 36-in. (carbon steel, designed for collapse).
- Outer pipe, 40-in. (carbon steel, designed for collapse-buckle propagation).
- U-value: 0.12 w/sq m-°C., based on the inner pipe ID.
- Outer pipe temperature, 16° C.

Maximum operating pressure equals 9 bar.

Leak rates

An engineering critical assessment performed in accordance with BS7910 Level 2 for 36% NiFe pipe used the calculated membrane hoop, longitudinal and bending stresses for the operating temperature and maximum pressure. The ECA showed that flaw sizes within DNV's acceptance criteria for radiography were stable over the design life of an LNG project. The maximum allowable flaw sizes were therefore used as the basis for calculating crack widths. The calculated crack widths proved consistent with reports of crack widths in stainless steel pipe from the nuclear industry, where the mean width for thermal and mechanical fatigue cracks are 15 and 8 μm, respectively.

Knowing the crack opening area, the upstream and downstream pressures, the upstream temperature, and upstream composition does not, however, allow calculation of the leak rate. The roughness and depth of the crack also need to be determined. The crack likely does not run exactly perpendicular to the surfaces of the wall and so will have a greater depth than the wall thickness.

Leak-rate calculation is enormously complex, involving multiphase flow with interfacial mass, heat, and momentum transfer; interactions with a rough wall; multiphase equilibria; and critical flow. A simplified approach recognizes that the predicted leak rate will be conservatively high and uses the Henry-Fauske model to predict leak rates.

This model accommodates critical flow, which is to be expected here due to the combination of low pressure, multiphase flow through the crack, and subcooled liquid upstream. The model's major shortcoming in the current context stems from its assuming that friction with the walls is negligible relative to pressure gradient and momentum effects. This assumption is completely appropriate for the modeling of high-velocity flows through orifices and converging nozzles, as recommended by the authors, but friction will obviously have a greater effect in flow through an 18 μm-wide crack.

The Henry-Fauske model stands validated against multiple data sets, including cases with subcooled liquid nitrogen flowing through nozzles where the flow is critical and the throat condition is liquid-vapor, making it appropriate for subcooled methane. The lack of any wall friction, however, will yield conservatively high leak rates.

Table 1 gives the results of Henry-Fauske calculations for a range of inner pipe (upstream) pressures. Throat (critical) pressures are 200-400 millibara. Throat pressures above the triple point yield a mixed vapor-liquid equilibrium condition. The calculated crack opening area of 0.18 sq mm yields a predicted maximum leak rate of 0.027 × 0.18 = 0.005 kg/sec; equivalent to 0.04 cu m LNG/hr or 16 cfm. Leak rates ranging from 0.005 to 0.04 cu m LNG/hr provided the basis for analysis.

LEAK MASS FLUXES PREDICTED BY HENRY-FAUSKE MODEL

Table 1

Inner pipe pressure, bar	Mass flux, kg/sec × sq mm	Leak rate, 0.18 sq mm crack area		
		kg/sec	cu m LNG/hr	cfm
9.2	0.027	0.0050	0.043	15.7
8.0	0.025	0.0046	0.039	14.4
7.0	0.024	0.0043	0.036	13.5
6.0	0.022	0.0039	0.034	12.2
5.0	0.020	0.0036	0.031	11.3
4.0	0.018	0.0032	0.027	10.0
3.0	0.015	0.0027	0.023	8.5
2.0	0.012	0.0022	0.019	6.9
1.0	0.008	0.0014	0.012	4.4

Leak detection

Pipeline leak-detection systems typically rely on pressure and flow measurements to infer the presence

Equations

$$\kappa = \frac{OD_{ins}}{ID_2} \quad (1)$$

$$Q = \frac{-F_c \cdot \pi \cdot \left(\frac{ID_2}{2}\right)^4}{8 \cdot \mu} \cdot \left[(1-\kappa^4) - \frac{(1-\kappa^2)^2}{\ln\left(\frac{1}{\kappa}\right)}\right] \cdot \frac{dP}{dz} \quad (2)$$

$$Q = -\alpha_1 \cdot \left(\frac{d}{dz}P\right) \quad (3)$$

$$\gamma := \frac{R_{ig} \cdot T}{MW_{gas}} \quad (4)$$

$$m = -\alpha_1 \cdot \gamma \cdot \rho \cdot \left(\frac{d}{dz}P\right) \quad (5)$$

$$\frac{d}{dz}m = -\alpha_1 \cdot \gamma \cdot \left[\rho \cdot \left(\frac{d^2}{dz^2}\rho\right) + \left(\frac{d}{dz}\rho\right)^2\right] \quad (6)$$

$$(S_{ann} + \varepsilon_{ins} \cdot S_{ins}) \cdot \left(\frac{d}{dt}\rho\right) = \frac{d}{dz}m \quad (7)$$

$$\alpha_2 := \frac{\alpha_1 \cdot \gamma}{S_{ann} + \varepsilon_{ins} \cdot S_{ins}} \quad (8)$$

$$\frac{d}{dt}\rho = \alpha_2 \cdot \left[\rho \cdot \frac{d^2}{dz^2}\rho + \left(\frac{d}{dz}\rho\right)^2\right] \quad (9)$$

$$\frac{\Delta P_{InnerAnnulus}}{\Delta P_{OuterAnnulus}} = -0.6 \quad (10)$$

Nomenclature

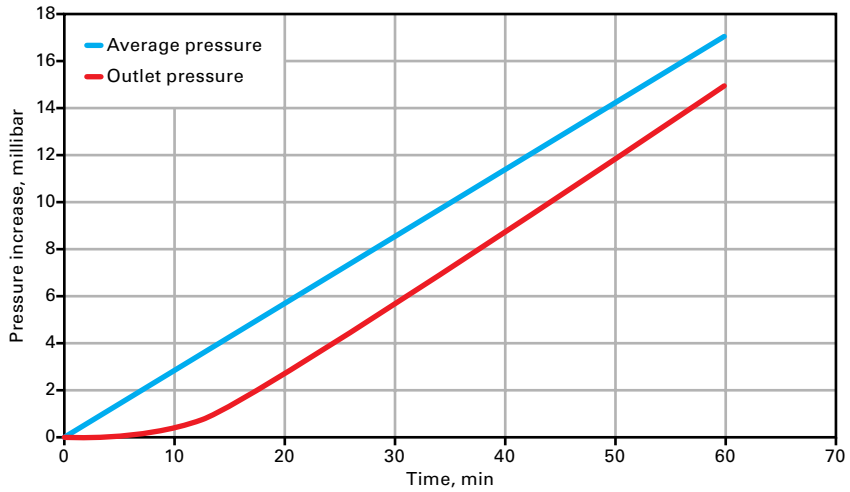
ID	=	Inside diameter
MW	=	Molecular weight
m	=	Mass flow rate
OD	=	Outside diameter
P	=	Pressure
Q	=	Volumetric flow rate
R_{ig}	=	Ideal gas constant
S	=	Cross-sectional area
T	=	Temperature
t	=	Time
V	=	Volume
z	=	Axial position measured from the leak location
α1	=	Grouping of parameters defined by Eqs. 2 and 3
α2	=	Grouping of parameters defined by Eq. 8
γ	=	Grouping of parameters in ideal gas law (Eq. 4)
ε	=	Porosity
ϰ	=	Ratio of inner to outer radii (Eq. 1)
μ	=	Viscosity
ρ	=	Mass density

Subscripts

1	=	Inner pipe
2	=	Intermediate pipe
ann	=	Annulus
ins	=	Insulation

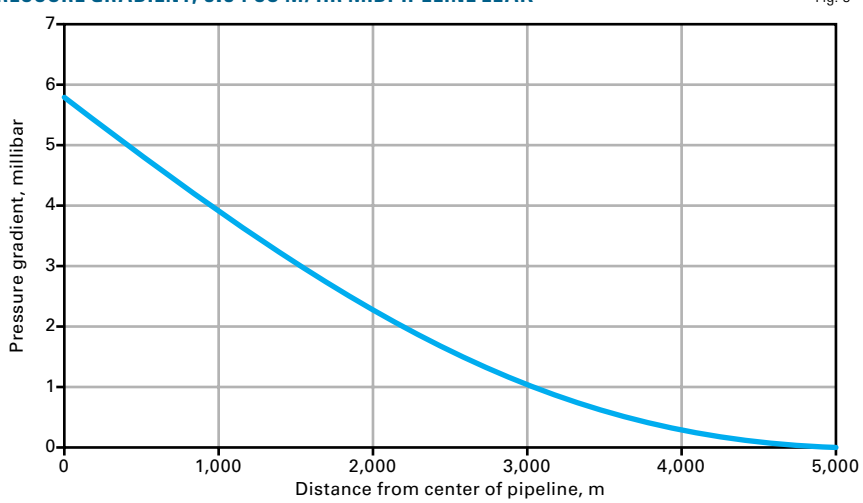
Pressure, 0.04 cu m/hr midpipeline leak

Fig. 4



Pressure gradient, 0.04 cu m/hr midpipeline leak

Fig. 5



of a leak. Ultrasonic or other direct-detection mechanisms can also detect leaks. Each of these methods has its own leak rate threshold, below which a leak cannot be detected. The closed inner annulus of this PIPIP pipe, however, allows detection of arbitrarily small leaks by pressure measurement; with the time required becoming the only question.

The time required to detect a leak via measurement of the inner annulus pressure depends on:

- Size of the leak.
- Inner annulus pressure before the leak.
- Accuracy of the inner annulus pressure measurement.
- Location of the leak (distance from the ends where the pressure measurement is made).
- Pressure drop in the annulus between the leak and the end of the pipeline.

The gauges specified for annulus-pressure monitoring on the ITP LPG pipeline in Peru provide the basis for pressure measurement accuracy. The pressure measurement gauges are accurate to ±6 millibar, up to 1,200 millibara. This gauge is sufficient, but more accurate gauges are also available.

Detection time

The elevated vapor mass created by a leak in the inner pipe causes pressure in the inner annulus to increase. The ±6-millibar accuracy of the gauges makes a 15-millibar increase in the pressure sufficient to detect a leak.

Two methods have calculated the time required to detect a 15-millibar increase in pressure as a function of leak size. The first is a simplified method, ignoring any pressure drop resulting from flow in the annulus and simply calculating the amount of methane necessary to increase the pressure by 15 millibar.

This proves quite easy (and independent of the starting pressure), since fluid in the annulus is an ideal gas. Once the amount of methane needed is known, dividing by the leak rate yields detection time, independent of leak location.

LEAK DETECTION TIMES

Table 2

Leak rate		Leak detection time, hr	
cu m LNG/hr	cfm	Fiber optic	Inner annulus pressure
0.005	1.8	17	7.1
0.01	3.7	3.2	3.6
0.04	14.7	0.5	1.0

The second method accounts for pressure drop in the annulus; that the pressure at the leak will be higher than at the ends of the pipeline, where it is measured. The leak is always assumed to occur at the point farthest from the pressure measuremens, as this requires the longest time to detect.

Gas leaks in the annulus stemming from a leak result in laminar flow. Analysis of the problem as pseudosteady state is also assumed. The radial velocity profile adjusts quickly to changes in pressure and flow. A momentum balance for the flow in the annulus then provides a relationship between the volumetric flow rate (Q) and the pressure gradient (Equations 1-3).

These equations represent the standard solution for laminar flow in an annulus, with correction F_c applied for eccentricity of the inner pipe. Integrating the standard solution around the circumference of the annulus, treating κ as a function of angular position determined by the geometry of the eccentricity, determines F_c.

Since the mass flow rate consists simply of the product of the volumetric flow rate and density, and the density is related to the pressure via the ideal gas law, the momentum balance can be written as shown in Equations 4-6.

A mass balance on a section of the annulus (including the void space in the insulation) yields Equation 7.

Combining the momentum and mass balances provides the final equations to be solved (Equations 8-9).

A semi-implicit technique in Mathcad solves the partial differential equation numerically. A variable-size mesh in the axial direction uses fine discretization close to the leak and coarser discretization far from the leak. The inlet boundary condition consists of a fixed mass flow rate (the leak rate) and the outlet boundary condition is no flow (the outlet is closed).

Fig. 3 shows the times required to detect a leak as a function of leak size. For leak sizes of interest, <0.04 cu m LNG/hr, the simplified calculation method provides a good estimate of detection time since the pressure drop becomes progressively less important for small leaks.

Fig. 4 shows the average annulus pressure and the outlet pressure (where the measurement is made) as a function of time. Fig. 5 shows the pressure profile at the time a leak would be detected from outlet pressure monitoring.

The closed, low-pressure annulus makes the leak-detection capability in the PIPIP system orders of magnitude better than can be achieved with convectional leak-detection systems. For example, a leak of 0.002 cu m LNG/hr, or 0.4 ppm relative to the flow rate, can be detected in 18 hr.

Differentiating leaks

By itself, the pressure measurement in the inner annulus cannot distinguish between a leak in the inner pipe and a leak in the intermediate pipe, since both will result in the inner annulus pressure rising. Two methods are available to distinguish the different leaks.

If the fiber optic measurement shows a decrease in temperature in a localized area, a leak of the inner pipe is indicated; a leak from the outer to the inner annulus has a negligible effect on the temperature of the outer annulus and the intermediate pipe wall where the fiber optic is located.

A leak in the intermediate pipe, however, will cause the pressure in the outer annulus to drop, which will be detectable. Since the fluids in both annuli are ideal gases at about the same temperature, the pressure change in the outer annulus is related to the pressure change in the inner annulus simply by the ratio of the volumes of the two annuli.

If the leak is in the intermediate pipe, the inner annulus pressure will increase at about 60% of the rate that the outer annulus pressure decreases (Equation 10). A gas detector connected to the inner annulus provides a further possibility for distinguishing between inner and intermediate pipe leaks. Detection of methane would indicate an inner pipe leak. This method would generally require use of vacuum pumps to pull gas in the inner annulus through the detector.

Temperature monitoring

The expected accuracy of fiber optic measurement is ±1° C. Given variations in soil coverage and ambient water temperatures, a local decrease of 4° C. indicates a leak. Since fiber optic measurement resolution is 1 m, the temperature 0.5 m from the leak provides the measure of when a leak is detected by the fiber optic.

A method was developed to predict the temperature of the intermediate pipe as a function of time and distance from the leak. This model was used to predict temperature profiles along the intermediate pipe for various leak rates. Table 2 summarizes these results. Leak-detection times via pressure measurement included in the table allow comparison. For leaks below about 0.01 cu m LNG/hr, pressure monitoring will detect the leak first. ✦

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In-rack liquid and gas flow computers enhanced

Version 2.05 upgrade has been released for the inRAx line of single-slot in-chassis flow computers for platforms from Rockwell Automation, Milwaukee.

The modules are tied directly into the back plane of the controller and act as an add-on calculator to the processor without burdening the PLC/PAC with complicated flow algorithms, the .

Version 2.05 modules provide these enhancements:

• *Modbus dictionary.* In flow applications, RTUs and SCADA networks often use the open modbus protocol because of its common support and its multipoint (polled) architecture. The inRAx flow computers provide a modbus master port to allow users to poll data from a remote chromatograph device. The modules have an internal modbus map, so for the convenience of the user the version 2.05 upgrade was equipped with a modbus dictionary,

which acts as an index for users to locate needed data.

• *Multimeter runs.* The company says stand-alone flow computers are relatively expensive and are often limited to only a few meter runs, which increases implementation and maintenance costs and creates more potential points of failure by complicating wiring designs. Alternatively, the inRAx integrated flow computer supports eight to 16 meter runs; and, now version 2.05 modules support multiple streams (as many as four per meter) and allow the PLC/PAC to switch the active stream via the module over the back plane of the controller.

• *Data archival/event logging.* Version 2.05 modules have an expanded data archival and event logging feature, which allows 35 regular daily and 48 regular hourly archives, and 1,440 daily and hourly extended archives per meter.

The inRAx line of flow computers use the AGA 3, 7, and 8 measurement standards and API 2540 calculation standards. Modules are available for the following Rockwell Automation platforms: ControlLogix (MVI56-AFC), SLC 500 (MVI46-AFC), PLC-5 (MVI71-AFC), and CompactLogix (MVI69-AFC).

Source: **ProSoft Technology Inc.,** 1675 Chester Ave., Bakersfield, CA 93301.

Baker Hughes Inc.,

Houston, has acquired two reservoir consulting firms, Gaffney, Cline & Associates (GCA) and GeoMechanics International (GMI), strengthening the company's capabilities in reservoir engineering, technical and managerial advisory services, and reservoir geomechanics. The company also has appointed D. Nathan Meehan, as vice-president, reservoir technology and consulting. Meehan will lead the company's reservoir engineering, reservoir consulting, and hydrocarbon development activities, including the GCA and GMI businesses. The two firms will continue to operate as stand-alone consultancies while providing advice and services to enhance the reservoir-related offerings of Baker Hughes product line divisions. In addition to reservoir engineering, GCA advises clients worldwide in exploration, reservoir evaluation, field development, drilling and production, pipeline, refining, and LNG projects. GMI is a leader in consulting, training, and software in the field of geomechanics and its application to oil and gas reservoirs. Meehan has more than 30 years of experience in reservoir engineering, reserve estimation, hydraulic fracturing, and horizontal well production. Previously, he served as president of CMG Petroleum Consulting, an independent consultancy providing petroleum engineering services to major, independent, and national oil companies, and oilfield service companies; vice-president, engineering, for Occidental Oil & Gas; and general manager, exploration and production services, for Union Pacific Resources. Meehan earned his BS in physics from Georgia Institute of Technology, his MS in petroleum engineering from the University of Oklahoma, and his PhD in petroleum engineering from Stanford University.


Meehan

Baker Hughes provides the worldwide oil and natural gas industry products and services for drilling, formation evaluation, completion, and production.

IDM Group,

Cyprus, has named Steve Krablin executive vice-president and CFO. He has more than 25 years of experience in the financial side of the international energy service industry, most recently as senior vice-president and CFO of National Oilwell Varco. Krablin is a graduate of the University of Arkansas and a certified public accountant.

IDM Group provides complete land rig packages and rig equipment to the energy industry from its primary facilities in Houston and Stryi, Ukraine.

GE Oil & Gas,

Florence, Italy, will establish its Americas regional headquarters at a new 13.5-acre site at Westway Park II, now under construction at the intersection of West Beltway 8 and Clay Road in Houston. The new location will also be the new business headquarters for VetcoGray and PII Pipeline Solutions. The new Houston facility will bring together close to 500 employees from several offices across the city, including all GE Oil & Gas employees currently based at the West Loop and Briarpark offices. They will be joined by a number of people from VetcoGray's North Houston Rosslyn Road facility. The move is expected to be completed in the first quarter of 2009. The announcement follows an earlier announcement that GE had completed the acquisition from Tenaris of Hydril Pressure Control, which will remain at its North Sam Houston Parkway location. GE will maintain manufacturing operations serving the offshore industry at its North Houston Rosslyn Road and Business Park Drive facilities and its GE Oil & Gas Americas Service Center at Aldine Westfield Road. In all, GE Oil & Gas employs 2,000 people in the Houston area.

GE Oil & Gas is a world leader in advanced technology equipment and services for all segments of the global oil and gas industry.

Wood Group Pressure Control,

Wood Group Pressure Control, Houston, has named Iain Murray vice-president of support services. He will have worldwide responsibility for project management and quotes, human resources, training, strategy, continuous improvement, and legal. Most recently, Murray worked with Wood Group's gas turbine services division as the CEO of Wood Group Generator Services and president of Wood Group Light Industrial Turbines, Americas. Previously, he served as general counsel for Wood Group in the Americas and spent 7 years working in private practice. Murray has an honors bachelor of laws degree from Edinburgh University.


Murray

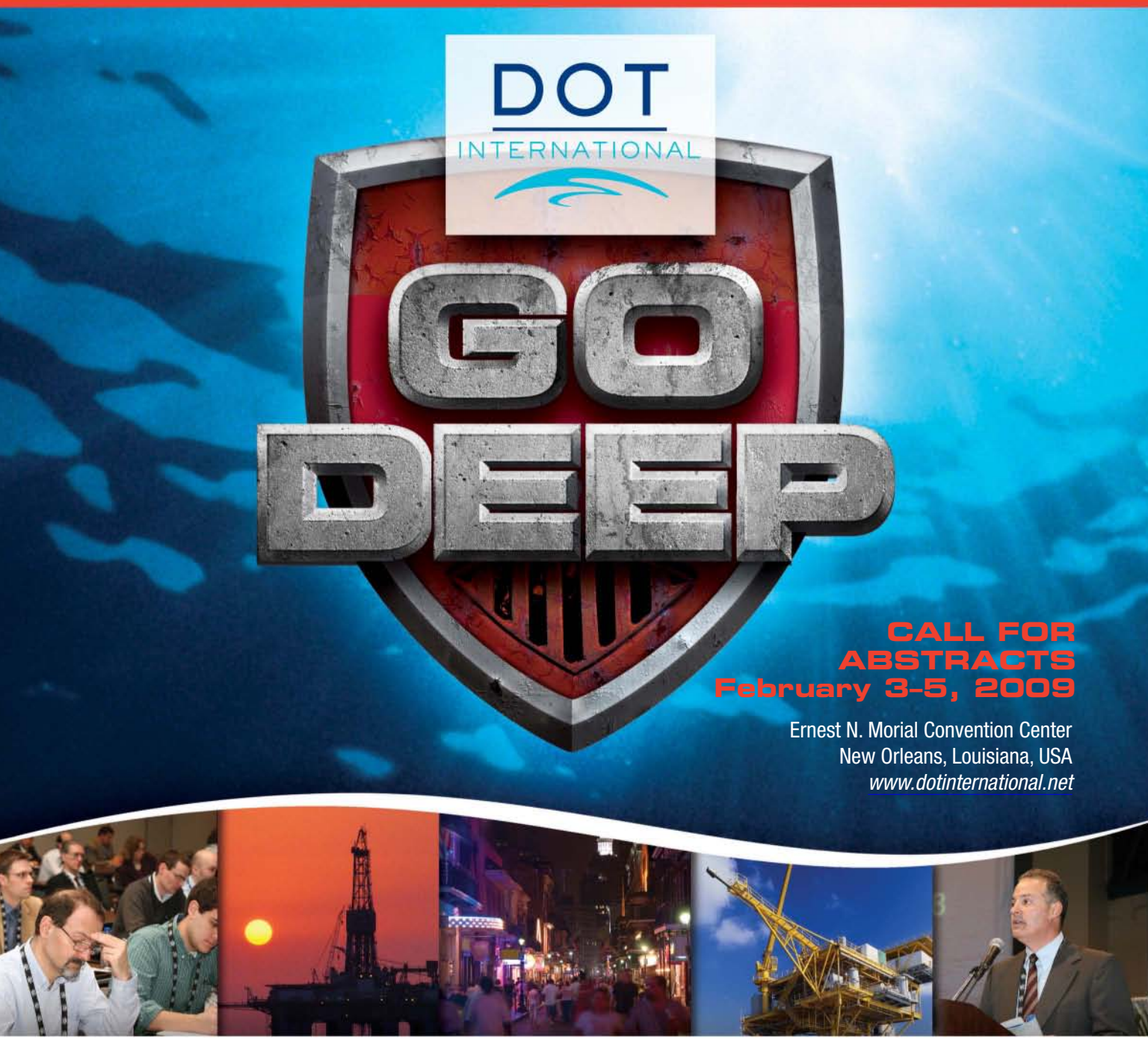
Wood Group Pressure Control designs and manufactures wellhead systems, gate valves, chokes, and actuators that control formation pressures and product flow from initial drilling through production for oil companies around the world. It is part of Wood Group, an Aberdeen-based international energy services company.

LeTourneau Technologies Inc.,

Longview, Tex., has appointed George Cupstid vice-president and general manager of offshore products. He has held seven positions over his 36 years with LeTourneau, most within the offshore products group. Cupstid's new duties include the development, implementation, and execution of LeTourneau's offshore products business strategy, which is primarily focused on the design, development, and manufacturing of jack up rigs and critical jack up components and accessories.

LeTourneau designed and fabricated the world's first jack up drilling rig in 1955 and has since built more than 179 jack ups.

Deep Offshore Technology International Returns to New Orleans



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Rotary Steerable System
BOPs & Well Control Equipment
Casing Running
Drilling Automation
Instrumentation

Imports of crude and products

	Districts 1-4 5-9 2008	Districts 1-4 5-2 2008	District 5 5-9 2008	District 5 5-2 2008	Total US 5-9 2008	Total US 5-2 2008	Total US *5-11 2007
	1,000 b/d						
Total motor gasoline	872	1,362	43	132	915	1,494	1,528
Mo. gas. blending comp.	621	977	6	121	627	1,098	893
Distillate	216	186	—	1	216	187	249
Residual	370	209	—	108	370	317	379
Jet fuel-kerosine	218	131	82	—	300	131	264
Propane-propylene	103	127	22	12	125	139	139
Other	877	–44	30	74	907	30	807
Total products	**3,277**	**2,948**	**183**	**448**	**3,460**	**3,396**	**4,259**
Total crude	**9,094**	**9,435**	**839**	**1,193**	**9,933**	**10,628**	**10,332**
Total imports	**12,371**	**12,383**	**1,022**	**1,641**	**13,393**	**14,024**	**14,591**

*Revised.
Source: US Energy Information Administration
Data available in OGJ Online Research Center.

Additional analysis of market trends is available through **OGJ Online**, *Oil & Gas Journal's* electronic information source, at http://www.ogjonline.com.

OIL&GAS JOURNAL online research center

OGJ crack spread

	*5-16-08	*5-18-07	Change	Change, %
	$/bbl			
SPOT PRICES				
Product value	138.42	90.64	47.78	52.7
Brent crude	98.75	67.94	30.81	45.4
Crack spread	39.66	22.71	16.96	74.7
FUTURES MARKET PRICES				
One month				
Product value	141.46	91.23	50.23	55.1
Light sweet crude	124.93	63.60	61.33	96.4
Crack spread	16.53	27.64	–11.10	–40.2
Six month				
Product value	137.25	81.98	55.27	67.4
Light sweet crude	123.97	68.05	55.92	82.2
Crack spread	13.27	13.92	–0.65	–4.7

*Average for week ending.
Source: Oil & Gas Journal
Data available in OGJ Online Research Center.

Purvin & Gertz LNG netbacks—May 16, 2008

Receiving terminal	Liquefaction plant: Algeria	Malaysia	Nigeria	Austr. NW Shelf	Qatar	Trinidad
	$/MMbtu					
Barcelona	8.78	6.35	7.80	6.22	7.06	7.70
Everett	10.19	7.62	9.73	7.67	8.32	10.56
Isle of Grain	10.06	7.79	9.27	7.70	8.34	9.30
Lake Charles	8.51	5.92	8.22	6.16	6.61	9.30
Sodegaura	7.06	9.67	7.31	9.31	8.47	6.22
Zeebrugge	9.10	6.67	8.34	6.54	7.32	8.34

Definitions, see OGJ Apr. 9, 2007, p. 57.
Source: Purvin & Gertz Inc.
Data available in OGJ Online Research Center.

Crude and product stocks

District	Crude oil	Motor gasoline: Total	Motor gasoline: Blending comp.[1]	Jet fuel, kerosine	Fuel oils: Distillate	Fuel oils: Residual	Propane-propylene
	1,000 bbl						
PADD 1	15,559	58,264	30,834	10,077	31,857	14,551	3,086
PADD 2	67,379	47,685	17,878	7,971	28,969	1,325	11,811
PADD 3	171,969	69,882	33,947	12,721	31,509	16,942	15,890
PADD 4	13,867	5,468	1,737	529	3,021	258	[1]766
PADD 5	56,985	28,869	22,291	9,086	11,706	6,244	—
May 9, 2008	**325,759**	**210,168**	**106,687**	**40,384**	**107,062**	**39,320**	**31,553**
May 2, 2008	**325,583**	**211,883**	**106,476**	**38,792**	**105,724**	**38,597**	**29,848**
May 11, 2007[2]	**342,220**	**195,235**	**89,772**	**39,995**	**119,756**	**38,178**	**31,455**

[1]Includes PADD 5. [2]Revised.
Source: US Energy Information Administration
Data available in OGJ Online Research Center.

Refinery report—May 9, 2008

District	Refinery operations: Gross inputs	Refinery operations: Crude oil inputs	Refinery output: Total motor gasoline	Refinery output: Jet fuel, kerosine	Refinery output: Fuel oils: Distillate	Refinery output: Fuel oils: Residual	Refinery output: Propane-propylene
	1,000 b/d		1,000 b/d				
PADD 1	1,487	1,498	1,965	108	478	124	60
PADD 2	3,280	3,252	2,421	190	964	43	207
PADD 3	7,366	7,289	2,863	738	2,167	380	672
PADD 4	555	554	302	27	172	14	[1]141
PADD 5	2,546	2,461	1,353	416	571	163	—
May 9, 2008	**15,234**	**15,054**	**8,904**	**1,479**	**4,352**	**724**	**1,080**
May 2, 2008	**14,948**	**14,649**	**8,677**	**1,400**	**4,239**	**715**	**1,115**
May 11, 2007[2]	**15,634**	**15,340**	**9,053**	**1,454**	**4,121**	**592**	**1,078**
	17,588 operable capacity		**86.6% utilization rate**				

[1]Includes PADD 5. [2]Revised.
Source: US Energy Information Administration
Data available in OGJ Online Research Center.

OGJ GASOLINE PRICES

	Price ex tax 5-14-08	Pump price* 5-14-08	Pump price 5-16-07
	¢/gal		
(Approx. prices for self-service unleaded gasoline)			
Atlanta	341.9	381.6	302.6
Baltimore	326.5	368.4	304.5
Boston	321.5	363.4	296.3
Buffalo	326.1	386.2	308.7
Miami	340.9	391.2	317.5
Newark	324.6	357.5	285.7
New York	312.9	373.0	306.5
Norfolk	318.2	355.8	292.5
Philadelphia	322.5	373.2	306.8
Pittsburgh	322.8	373.5	295.5
Wash., DC	342.6	381.0	309.9
PAD I avg.	327.3	373.2	302.4
Chicago	354.1	405.0	345.9
Cleveland	314.7	361.1	303.9
Des Moines	316.8	357.2	300.8
Detroit	321.8	371.0	310.0
Indianapolis	322.1	367.1	311.6
Kansas City	313.2	349.2	297.5
Louisville	341.2	378.1	308.2
Memphis	315.4	355.2	288.2
Milwaukee	332.6	383.9	321.9
Minn.-St. Paul	322.5	362.9	303.4
Oklahoma City	316.7	352.1	297.6
Omaha	313.7	360.1	306.2
St. Louis	330.9	366.9	297.3
Tulsa	311.8	347.2	297.3
Wichita	308.7	352.1	299.8
PAD II avg.	322.4	364.6	306.0
Albuquerque	319.8	356.2	307.7
Birmingham	322.5	361.2	291.5
Dallas-Fort Worth	324.7	363.1	295.1
Houston	319.8	358.2	292.5
Little Rock	320.0	360.2	290.8
New Orleans	318.8	357.2	289.0
San Antonio	315.6	354.0	280.3
PAD III avg.	320.2	358.6	292.4
Cheyenne	310.0	342.4	292.3
Denver	332.0	372.4	310.8
Salt Lake City	312.8	355.7	305.0
PAD IV avg.	318.2	356.8	302.7
Los Angeles	335.9	394.4	345.6
Phoenix	306.6	344.0	308.5
Portland	327.7	371.0	332.0
San Diego	344.4	402.9	354.2
San Francisco	351.1	409.6	371.4
Seattle	327.6	380.0	338.7
PAD V avg.	332.2	383.7	341.7
Week's avg.	**324.4**	**368.0**	**307.7**
Apr. avg.	**296.4**	**339.3**	**278.3**
Mar. avg.	**276.1**	**319.7**	**254.0**
2008 to date	**278.5**	**322.1**	—
2007 to date	**210.2**	**253.8**	—

*Includes state and federal motor fuel taxes and state sales tax. Local governments may impose additional taxes.
Source: Oil & Gas Journal.
Data available in OGJ Online Research Center.

REFINED PRODUCT PRICES

	5-9-08 ¢/gal		5-9-08 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	309.25	New York Harbor	364.27
Gulf Coast	311.50	Gulf Coast	361.02
Los Angeles	320.50	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	294.61	ARA	379.22
Singapore	307.81	Singapore	368.81
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	321.25	New York Harbor	211.02
Gulf Coast	331.85	Gulf Coast	218.38
Los Angeles	325.50	Los Angeles	220.49
		ARA	216.91
		Singapore	222.00

Source: DOE Weekly Petroleum Status Report.
Data available in OGJ Online Research Center.

BAKER HUGHES RIG COUNT

	5-16-08	5-18-07
Alabama	6	4
Alaska	7	7
Arkansas	47	45
California	42	32
Land	40	31
Offshore	2	1
Colorado	122	110
Florida	0	0
Illinois	1	0
Indiana	2	2
Kansas	11	14
Kentucky	10	7
Louisiana	149	177
N. Land	50	56
S. Inland waters	23	28
S. Land	20	30
Offshore	56	63
Maryland	1	0
Michigan	1	1
Mississippi	10	12
Montana	10	20
Nebraska	0	0
New Mexico	76	79
New York	8	5
North Dakota	63	33
Ohio	12	13
Oklahoma	205	182
Pennsylvania	20	14
South Dakota	2	2
Texas	902	830
Offshore	10	11
Inland waters	2	1
Dist. 1	30	19
Dist. 2	35	25
Dist. 3	64	60
Dist. 4	90	95
Dist. 5	178	174
Dist. 6	118	122
Dist. 7B	35	39
Dist. 7C	68	54
Dist. 8	129	118
Dist. 8A	27	24
Dist. 9	39	34
Dist. 10	77	54
Utah	40	41
West Virginia	26	34
Wyoming	73	71
Others—AZ-1; NV-2; OR-2; TN-5; VA-6	16	9
Total US	**1,862**	**1,744**
Total Canada	**132**	**121**
Grand total	**1,994**	**1,865**
Oil rigs	381	276
Gas rigs	1,471	1,466
Total offshore	69	75
Total cum. avg. YTD	**1,793**	**1,739**

Rotary rigs from spudding in to total depth.
Definitions, see OGJ Sept. 18, 2006, p. 46.

Source: Baker Hughes Inc.
Data available in OGJ Online Research Center.

SMITH RIG COUNT

Proposed depth, ft	Rig count	5-16-08 Percent footage*	Rig count	5-18-07 Percent footage*
0-2,500	77	5.1	56	8.9
2,501-5,000	111	54.0	107	51.4
5,001-7,500	224	165	230	18.2
7,501-10,000	413	3.3	418	3.1
10,001-12,500	473	2.7	440	3.1
12,501-15,000	274	0.3	269	0.7
15,001-17,500	116	—	100	1.0
17,501-20,000	73	—	79	—
20,001-over	34	—	37	—
Total	**1,795**	**7.1**	**1,736**	**7.6**
INLAND	27		43	
LAND	1,708		1,628	
OFFSHORE	60		65	

*Rigs employed under footage contracts.
Definitions, see OGJ, Sept. 18, 2006, p. 42.

Source: Smith International Inc.
Data available in OGJ Online Research Center.

OGJ PRODUCTION REPORT

	[1]5-16-08	[2]5-18-07
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	15	19
Alaska	724	760
California	658	670
Colorado	44	45
Florida	6	5
Illinois	25	27
Kansas	95	102
Louisiana	1,360	1,331
Michigan	15	16
Mississippi	50	52
Montana	92	94
New Mexico	164	163
North Dakota	116	115
Oklahoma	174	171
Texas	1,352	1,363
Utah	45	51
Wyoming	144	145
All others	61	75
Total	**5,140**	**5,204**

[1]OGJ estimate. [2]Revised.

Source: Oil & Gas Journal.
Data available in OGJ Online Research Center.

US CRUDE PRICES

	5-16-08 $/bbl*
Alaska-North Slope 32°	96.05
South Louisiana Sweet	128.50
California-Kern River 13°	113.50
Lost Hills 30°	123.25
Southwest Wyoming Sweet	117.79
East Texas Sweet	122.25
West Texas Sour 34°	115.25
West Texas Intermediate	122.75
Oklahoma Sweet	122.75
Texas Upper Gulf Coast	119.25
Michigan Sour	115.75
Kansas Common	121.75
North Dakota Sweet	115.50

*Current major refiner's posted prices except North Slope lags 2 months. 40° gravity crude unless differing gravity is shown.

Source: Oil & Gas Journal.
Data available in OGJ Online Research Center.

WORLD CRUDE PRICES

	5-9-08 $/bbl[1]
United Kingdom-Brent 38°	118.77
Russia-Urals 32°	113.46
Saudi Light 34°	114.41
Dubai Fateh 32°	111.85
Algeria Saharan 44°	120.10
Nigeria-Bonny Light 37°	122.36
Indonesia-Minas 34°	119.39
Venezuela-Tia Juana Light 31°	115.32
Mexico-Isthmus 33°	115.21
OPEC basket	116.95
Total OPEC[2]	114.94
Total non-OPEC[2]	115.32
Total world[2]	115.11
US imports[3]	112.96

[1]Estimated contract prices. [2]Average price (FOB) weighted by estimated export volume. [3]Average price (FOB) weighted by estimated import volume. Source: DOE Weekly Petroleum Status Report.
Data available in OGJ Online Research Center.

US NATURAL GAS STORAGE[1]

	5-9-08	5-2-08	5-9-07	Change, %
	bcf			
Producing region	576	549	711	–19.0
Consuming region east	743	690	821	–9.5
Consuming region west	210	197	284	–26.1
Total US	**1,529**	**1,436**	**1,816**	**–15.8**
	Feb. 08	**Feb. 07**	**Change, %**	
Total US[2]	**1,465**	**1,649**	**–11.2**	

[1]Working gas. [2]At end of period.
Source: Energy Information Administration.
Data available in OGJ Online Research Center.

World oil balance

	2007 4th qtr.	2007 3rd qtr.	2007 2nd qtr.	2007 1st qtr.	2006 4th qtr.	2006 3rd qtr.
	Million b/d					
DEMAND						
OECD						
US & Territories	21.00	21.03	20.97	21.07	21.09	21.25
Canada	2.40	2.38	2.28	2.34	2.29	2.31
Mexico	2.08	1.98	2.07	2.05	2.00	1.96
Japan	5.22	4.67	4.61	5.39	5.29	4.75
South Korea	2.31	2.06	2.12	2.35	2.32	2.04
France	2.00	1.93	1.85	1.97	1.95	1.93
Italy	1.72	1.63	1.67	1.69	1.71	1.68
United Kingdom	1.73	1.75	1.78	1.80	1.81	1.78
Germany	2.55	2.56	2.38	2.38	2.71	2.75
Other OECD Europe	7.61	7.53	7.25	7.35	7.55	7.46
Australia & New Zealand	1.12	1.09	1.07	1.09	1.10	1.07
Total OECD	**49.74**	**48.61**	**48.05**	**49.48**	**49.82**	**48.98**
NON-OECD						
China	7.87	7.59	7.52	7.33	7.45	7.17
FSU	4.32	4.22	4.32	4.25	4.36	4.27
Non-OECD Europe	0.79	0.73	0.78	0.85	0.78	0.72
Other Asia	8.93	8.64	8.83	8.74	8.80	8.52
Other non-OECD	14.97	15.26	14.95	14.67	14.47	14.71
Total non-OECD	**36.88**	**36.44**	**36.40**	**35.84**	**35.86**	**35.39**
TOTAL DEMAND	**86.62**	**85.05**	**84.45**	**85.32**	**85.68**	**84.37**
SUPPLY						
OECD						
US	8.56	8.40	8.53	8.43	8.40	8.38
Canada	3.33	3.35	3.33	3.42	3.39	3.31
Mexico	3.35	3.46	3.61	3.59	3.52	3.71
North Sea	4.57	4.28	4.49	4.80	4.76	4.51
Other OECD	1.57	1.56	1.54	1.50	1.55	1.55
Total OECD	**21.38**	**21.05**	**21.50**	**21.74**	**21.62**	**21.46**
NON-OECD						
FSU	12.66	12.55	12.60	12.61	12.48	12.26
China	3.86	3.87	3.96	3.92	3.81	3.85
Other non-OECD	11.41	11.42	11.22	10.90	11.22	11.37
Total non-OECD, non-OPEC	**27.93**	**27.84**	**27.78**	**27.43**	**27.51**	**27.48**
OPEC	**36.19**	**35.41**	**35.09**	**35.01**	**35.49**	**36.20**
TOTAL SUPPLY	**85.50**	**84.30**	**84.37**	**84.18**	**84.62**	**85.14**
Stock change	**–1.12**	**–0.75**	**–0.08**	**–1.14**	**–1.06**	**0.77**

Source: DOE International Petroleum Monthly
Data available in OGJ Online Research Center.

OECD total net oil imports

	Jan. 2008	Dec. 2007	Nov. 2007	Jan. 2007	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million b/d					
Canada	–1,221	–1,267	–1,308	–1,340	119	–8.9
US	11,869	11,484	11,569	12,145	–276	–2.3
Mexico	–1,220	–1,258	–1,512	–1,592	372	–23.4
France	2,089	1,941	1,945	1,699	390	23.0
Germany	2,392	2,310	2,176	2,168	224	10.3
Italy	1,509	1,701	1,642	1,661	–152	–9.2
Netherlands	1,033	1,215	1,212	1,094	–61	–5.6
Spain	1,677	1,627	1,514	1,509	168	11.1
Other importers	4,441	3,905	4,192	4,127	314	7.6
Norway	–2,089	–2,297	–2,030	–2,673	584	–21.8
United Kingdom	–129	–90	168	104	–233	–224.0
Total OECD Europe	**10,923**	**10,312**	**10,819**	**9,689**	**1,234**	**12.7**
Japan	5,434	5,727	5,101	5,573	–139	–2.5
South Korea	2,556	2,281	1,909	2,349	207	8.8
Other OECD	938	699	852	768	170	22.1
Total OECD	**29,279**	**27,978**	**27,430**	**27,592**	**1,687**	**6.1**

Source: DOE International Petroleum Monthly
Data available in OGJ Online Research Center.

OECD* total gross imports from OPEC

	Jan. 2008	Dec. 2007	Nov. 2007	Jan. 2007	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million b/d					
Canada	577	397	409	549	28	5.1
US	6,413	6,310	6,102	6,365	48	0.8
Mexico	31	40	32	17	14	82.4
France	868	925	792	792	76	9.6
Germany	467	484	360	436	31	7.1
Italy	1,318	1,306	1,272	1,312	6	0.5
Netherlands	774	774	642	596	178	29.9
Spain	654	691	562	700	–46	–6.6
Other importers	1,263	1,221	1,281	1,316	–53	–4.0
United Kingdom	183	273	257	166	17	10.2
Total OECD Europe	**5,527**	**5,674**	**5,166**	**5,318**	**209**	**3.9**
Japan	4,822	4,442	4,419	4,433	389	8.8
South Korea	2,472	2,490	2,158	2,294	178	7.8
Other OECD	583	740	692	757	–174	–23.0
Total OECD	**20,425**	**20,093**	**18,978**	**19,733**	**692**	**3.5**

*Organization for Economic Cooperation and Development.
Source: DOE International Petroleum Monthly
Data available in OGJ Online Research Center.

US petroleum imports from source country

	Jan. 2008	Dec. 2007	Average YTD 2008	Average YTD 2007	Chg. vs. previous year Volume	Chg. vs. previous year %
	1,000 b/d					
Algeria	636	600	636	778	–142	–18.3
Angola	578	439	578	574	4	0.7
Kuwait	239	158	239	172	67	39.0
Nigeria	1,191	1,271	1,191	1,136	55	4.8
Saudi Arabia	1,503	1,686	1,503	1,563	–60	–3.8
Venezuela	1,290	1,387	1,290	1,195	95	7.9
Other OPEC	976	568	976	675	301	44.6
Total OPEC	**6,413**	**6,109**	**6,413**	**6,093**	**320**	**5.3**
Canada	2,586	2,360	2,586	2,470	116	4.7
Mexico	1,307	1,322	1,307	1,566	–259	–16.5
Norway	86	110	86	105	–19	–18.1
United Kingdom	213	238	213	194	19	9.8
Virgin Islands	380	387	380	425	–45	–10.6
Other non-OPEC	2,507	2,329	2,507	2,771	–264	–9.5
Total non-OPEC	**7,079**	**6,746**	**7,079**	**7,531**	**–452**	**–6.0**
TOTAL IMPORTS	**13,492**	**12,855**	**13,492**	**13,624**	**–132**	**–1.0**

Source: DOE Monthly Energy Review
Data available in OGJ Online Research Center.

Oil stocks in OECD countries*

	Jan. 2008	Dec. 2007	Nov. 2007	Jan. 2007	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million bbl					
France	183	184	177	186	–3	–1.6
Germany	278	275	270	285	–7	–2.5
Italy	136	133	130	128	8	6.3
United Kingdom	95	98	98	105	–10	–9.5
Other OECD Europe	691	673	668	674	17	2.5
Total OECD Europe	**1,383**	**1,363**	**1,343**	**1,378**	**5**	**0.4**
Canada	208	203	206	183	25	13.7
US	1,677	1,662	1,686	1,723	–46	–2.7
Japan	620	621	622	643	–23	–3.6
South Korea	155	143	149	153	2	1.3
Other OECD	108	106	106	105	3	2.9
Total OECD	**4,151**	**4,098**	**4,112**	**4,185**	**–34**	**–0.8**

*End of period.
Source: DOE International Petroleum Monthly Report
Data available in OGJ Online Research Center.

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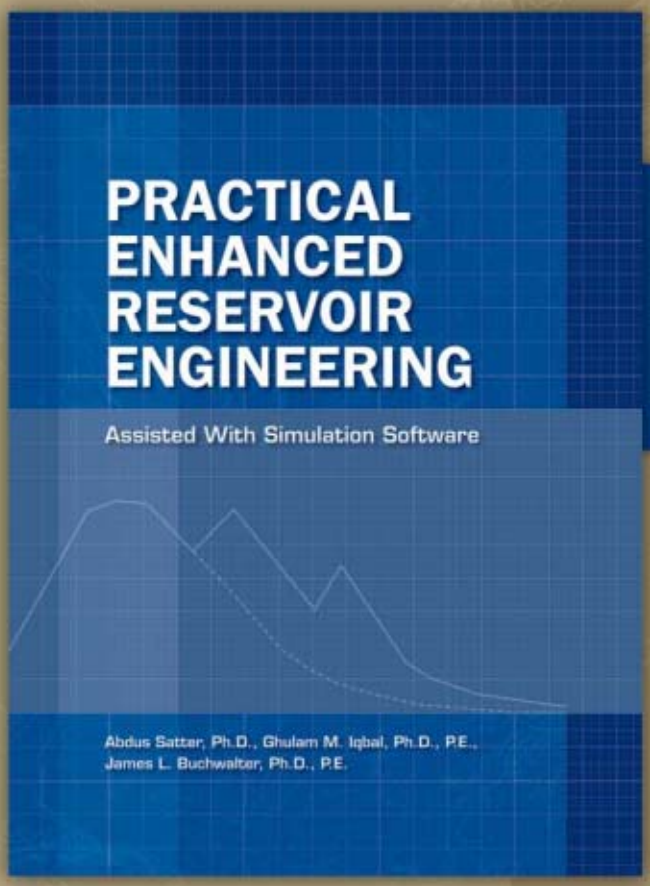

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Why suspension of SPR fill can lower oil prices

"Extrapolation of this fall's evidence could take prices as high as an unbelievable $120 if adult supervision is not brought to bear on DOE."

Consultant Philip K. Verleger Jr. issued that prophecy to two Senate subcommittees last Dec. 11. Since then, $120/bbl crude oil has become painfully believable.

Adult supervision has arrived. Under bipartisan pressure from Congress, the Department of Energy on May 16 announced it is suspending by as much as 13 million bbl this year's acquisition of crude for the Strategic Petroleum Reserve.

Until now, the Bush administration had argued that 70,000 b/d or so of crude acquisition for the SPR couldn't influence price in an 86 million b/d oil market.

That would be right if all crude were alike. It's not. And the market's longstanding preference for light, sweet crude has intensified recently because of growing requirements for light products with sharply reduced sulfur levels.

In his Senate testimony, Verleger noted that a leap in crude prices last year away from 2006 levels coincided with DOE's revival of acquisition of crude for the SPR. About 33% of crude acquired for SPR is sweet.

Verleger estimated that SPR purchases lowered global supply of light, sweet crude by as much as 0.3% and raised the price by perhaps 10%. At the time, the light, sweet crude price was $94/bbl.

The Organization of Petroleum Exporting Countries makes a companion point in its May Monthly Oil Market Report (OGJ Online, May 15, 2008).

OPEC points out that growth in demand for distillate was more than twice that of gasoline during 2000-07 while construction of refinery processing capacity tilted strongly toward the slower-growing product. So refiners must run light crude to meet soaring demand for distillate, especially diesel, and the price spread between light and heavy crude grades has widened.

Meanwhile, Iran is chartering tankers in which to store heavy crude it can't sell.

More so than usual, market tightness is a phenomenon of the light, sweet end of the crude-quality spectrum.

More so than seems probable, therefore, suspension of SPR fill can be expected to make a difference in price.

(Online May 16, 2008; author's e-mail: bobt@ogjonline.com)

The Editor's Perspective

by Bob Tippee, Editor

Market Journal

by Sam Fletcher, Senior Writer

Earthquake may shake energy market

Days after the massive May 12 earthquake hit the Sichuan province of central China, its potential impact on world energy markets remained uncertain, but damage to hydroelectric and nuclear power plants could prove critical, analysts said.

The earthquake was reported to have damaged as many as 17 dams in Sichuan and neighboring provinces. French nuclear experts said it possibly could have damaged several nuclear fuel and research sites as well. Moreover, recovery efforts could boost demand for petroleum fuels for construction and transportation.

"Oil demand growth from 2007 to 2008 in China was recently estimated by the International Energy Agency to come in at 350,000 b/d on a base of 7.54 million b/d. In our view, the earthquake may actually add to this forecast," said Adam Sieminski, chief energy economist, Deutsche Bank, Washington.

The Sichuan province is China's main gas producer and consumer, accounting for a quarter of the country's gas production. PetroChina, the primary operator, said it had restored a third of the daily output of 6 million cu m of gas that was shut in after the quake. Sinopec's giant Chuanxi gas field in Sichuan was reported to be producing at 20% of capacity after many chemical plants were closed, up from only 10% earlier when 1,000 gas wells were shut in. As of May 15, the field was reported to be producing 1.6 million cu m/d.

OPEC's outlook

In its latest monthly market report, the Organization of Petroleum Exporting Countries still sees world economic growth at 3.9% in 2008, unchanged from the previous month amid signs that the credit crisis may be easing. Forecasts for Japan were revised slightly up, while those for the "euro zone" were slightly down. OPEC's forecast for US economic growth was unchanged at 1.1%.

"In the narrow technical sense, the US is not yet in recession. Advance figures for US gross domestic product in the first quarter still indicate positive growth, albeit at a meager 0.6% yearly rate, mainly on continued strength in exports and a rise in inventories. US payrolls in April fell for the fourth month, but the loss of 20,000 jobs was much smaller than the average of 80,000/month in the first quarter of 2008," said OPEC analysts. "Overall, the better-than-expected data and signs that the Fed's easing cycle were at an end helped lift the dollar from its lows vs. the euro and yen. Inflation continued to trouble China, India, and other emerging markets and could dampen growth in the months ahead."

Oil demand in April was "very weak" within the Organization for Economic Cooperation and Development, although winter product demand improved across Europe. US oil consumption declined sharply, due to both the slowing economy and warm winter weather, and is expected to experience the usual seasonal drop in consumption in the second quarter. "This year's summer driving season is not likely to show its normal annual growth due to the anticipated weaker gasoline demand in the US," OPEC said. "North America is forecast to be flat, while oil demand in other OECD regions is expected to decline due to weakening transport fuel demand in the second quarter."

The group lowered its forecast for non-OPEC supply growth in 2008 to 700,000 b/d, with production reductions in Mexico, Norway, UK, Denmark, Australia, New Zealand, Brazil, and Russia to be partially offset by increases in India, Syria, and Chad. Growth in OPEC NGLs and nonconventional oils now stands at 340,000 b/d in 2007 and 540,000 b/d for 2008.

In April, OPEC crude production averaged 31.7 million b/d, a decline of 393,000 b/d from the previous month due to production disruptions in Nigeria and Iraq. Demand for OPEC crude in 2007 was estimated to average 32 million b/d, an increase of 280,000 b/d over the previous year. In 2008, the demand for OPEC crude is expected to average 31.8 million b/d, or 120,000 b/d lower than in the previous year.

OPEC said it continues to produce 32 million b/d, and its excess capacity has grown to more than 3 million b/d. "The start-up of new projects, such as the 500,000 b/d Khursaniyah field in Saudi Arabia, should help to further ease market fundamentals," the report said.

The cartel also said, "The surge in crude oil prices since the start of this year has not been equal across all crude grades. While light, sweet West Texas Intermediate has increased by more than $24/bbl, heavy grades have risen by much less, resulting in a widening differential between light sweet and heavy sour crudes."

(Online May 19, 2008; author's e-mail: samf@ogjonline.com)